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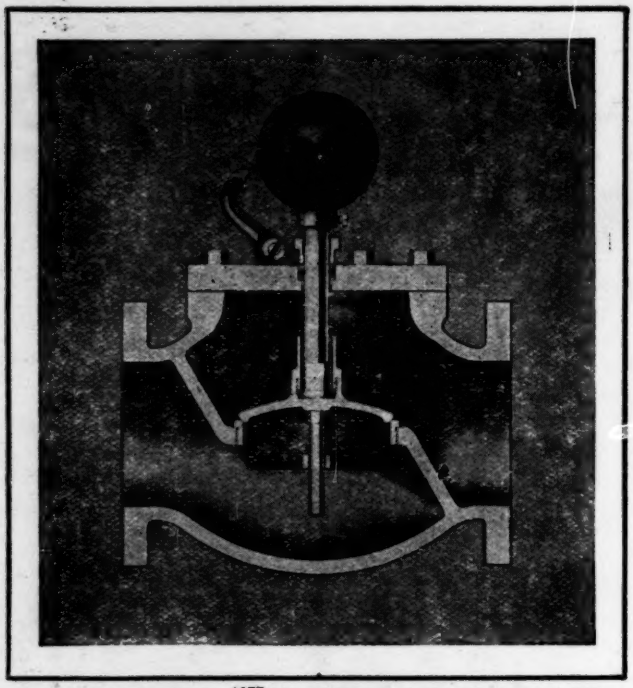

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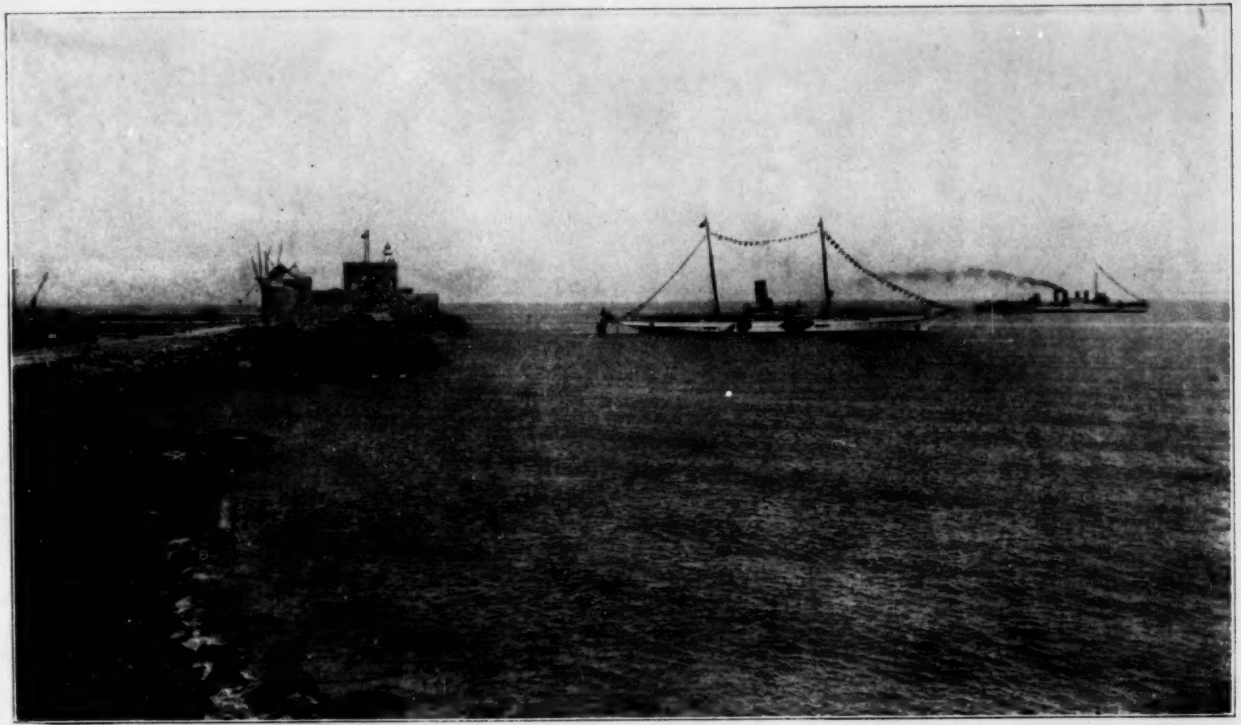

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U.S.S. "GOFF" AT RHODES

The lighthouse at left stands on the site of the ancient Colossus of Rhodes

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

VOL. No. 51, No. 3 MARCH, 1925 WHOLE No. 265

PROPOSED ADMINISTRATIVE CHANGES IN NAVY DEPARTMENT

BY COMMANDER C. W. FISHER (CC) U. S. NAVY

AUTHOR'S NOTE: In the following pages I have attempted to make an historical and logical analysis of a situation that has existed for many years in the Navy—a situation not capable of being definitely named or concisely defined, but, nevertheless, a situation that each year provokes an increasing amount of dissatisfaction and unrest among the officers of every branch of our service. There is a growing belief that all is not well with the administration and organization of the Navy Department, with the navy yards and other shore establishments, with the accounting system of navy yards, with the relations between the fleet and the navy yards, with the relations between the line and staff. This belief has found expression in recent years in many and varied ways. Boards and conferences have been called upon to study the management of navy yards, to revise the accounting system, to study the organization of the Navy Department. Bills have been submitted to Congress to amalgamate the line and the staff and to equalize promotion. General Orders have been issued looking toward a centralized management of navy yards. I have felt that such expressions of feeling must be due to some one underlying cause, notwithstanding the fact that each apparently has no relation to the others. Whether or not I have proved this to be the case is left to the judgment of the reader.

It has not been possible, within the space available, to discuss the situation from every angle—the subject is a very large one—and I have naturally attacked it along the lines with which I am most familiar. Nevertheless, the careful reader will not fail to see that all of the questions mentioned have their place in the analysis.

In this work I have been struck by two things. There seems to be a distinct line of cleavage in the thought of naval officers regarding questions of organization and management. A junior group, that is, those up to and including the junior captains, are generally convinced that some changes in the existing order of things is essential. Many of the more senior officers

U.S.S. "GOFF" AT RHODES

The lighthouse at left stands on the site of the ancient Colossus of Rhodes

Photograph by Lieut. W. H. Perry, U. S. N.

will not admit this. This cleavage has seemed to me something more than the conservatism of age and the radicalism of youth. Can it be that the existing conditions are thus self-perpetuating and beyond the possibility of progress and improvement?

The other striking thing is the general failure of officers to write plainly and bluntly on subjects concerning the relations of individuals. Search of naval officers' writings for many years past shows a startingly small number who have cared to voice their opinions with the bluntness and vigor of Matthew Fontaine Maury, who, many will be surprised to learn, fought almost single handed a winning fight for the reform of the educational, administrative and organization systems of the old Navy. What a pity that the principle of organization which he so clearly saw was not adhered to!

For there is a principle of organization and the Navy is violating this principle, and the unpleasant results of this violation are springing up in strange, unexpected places.

If the attention of the service can be focused on the principle involved, and if the correct principle be adopted, it makes little difference what becomes of the details.

The objections to the plan proposed will be the unwillingness of any bureau to give up any part of its power and prerogatives. This would place bureau loyalty ahead of navy loyalty, for if no change is ever to be made in the bureaus, our system of departmental administration is beyond improvement, a fixed, cumbersome law of the Medes and Persians that altereth not—while the world moves on.

Present Conditions.—We are in the habit of saying that our navy yards exist for the purpose of serving the fleet. All sea-going officers, however, will acknowledge that the service rendered is far from ideal. Instead of trying to make as simple as possible the relations between the ship and the yard, it is hardly too much to say that these relations have been made as complicated as possible. The average ship arriving at a navy yard has three simple requirements:

First, that facilities be provided to enable the ship to carry on her own work.

Second, that her needed stores be supplied.

Third, that the yard perform the authorized repairs and alterations on the vessel.

It should be a very simple matter to meet these requirements, but, unfortunately, it is not. The yard is the custodian of a mass of rules, regulations, bureau instructions, laws, comptroller's decisions, lines of cognizance and, last but by no means least, of a

variety of appropriations and "titles," through which the simple needs of the ship must be sifted before any work can be undertaken. The commanding officer of the ship finds to his surprise that instead of commanding a single entity, a unit of the fleet, he is really captain of a conglomeration of articles and functions, each of which must be referred to separate and distinct yard agencies. Before reaching the yard his work requests and requisitions must be divided up according to appropriations and bureau cognizance, and one simple item of work may require three separate letters and three separate requisitions. Not only that, but he must remember that he has to deal with no less than three arbitrary systems of cognizance; namely, the cognizance according to his ship organization, that of the yard organization, and that of the bureaus at Washington.

It may be thought that these differences in cognizance, this lack of parallel organization, would do no more harm than to irritate tempers and complicate paper work. But something else is involved in these differences—something vital—that actually delays and sometimes even prevents the execution of needed work on our ships. This vital element is money, without which no navy-yard work can be performed. Congress appropriates money for the bureaus, or the bureaus have been established to conform to the appropriation acts, whichever way you take it. In any event the bureaus dispense the money to the navy yards, and the allotment from one bureau may not be used for work under the cognizance of another bureau. Hence it may, and frequently does happen that a yard may be able to do the engineering work on a ship, but due to lack of funds, be unable to execute the construction and repair work on the same ship. What is the result? The ship must leave the yard with repairs uncompleted, or wait until funds are available. In either case the fleet suffers. Every flag officer and every officer exercising command can, from personal experience, enlarge upon the complications that have been merely touched upon here.

When it is realized that comparatively few ship's officers have had sufficient navy yard duty to familiarize themselves with yard methods and organization, and that the methods and organization of no two of our navy yards are alike, the difficulties of the situation are apparent. Commandants of navy yards are now en-

deavoring to assist the ships and to simplify procedure, as is also the Department, but great improvement along these lines is impossible without certain modifications in naval administration. How much simpler it would be for the fleet, if all ship work were under one appropriation, if there were no questions of bureau cognizance, if the navy yard organizations paralleled that of the Navy Department, and if all yards were alike in their methods.

The departmental control of the material condition of the ships of the fleet is also complicated in somewhat the same way. Since the naval appropriations have been reduced, the office of Naval Operations is daily becoming more vitally concerned with the ability of navy yards to perform the maximum amount of ship work with the money allotted each month. Strangely enough, it appears that those yards with the largest number of employees are not those that can be given additional ship work without demanding an increase in the regular monthly allotments. Attempts to discover the reason for this have brought out the fact that definite departmental control of ship work is so seriously complicated by the number of appropriations, bureaus, titles and the fluctuating overhead that it is doubtful if this control is more than nominal.

All such questions inevitably hark back to appropriations and accounting, because the yard allotments of money measure the degree of activity of the yard and the amount of work it can perform. The actual amount of ship work that can be turned out by a yard under the given allotment is influenced by the accounting system, which determines the amount of the overhead charges. The greater the overhead the less the productive ship work that can be accomplished out of the funds allotted. Hence, although the fleet may not realize it, the accounting system is an important factor in determining to what extent the shore establishment can keep the fleet in condition. The accounting system is not only complicated, but unsatisfactory. It has been revised and changed in theory and detail during the past ten years to such an extent that only a few officers of the Navy are really familiar with it. In July, 1922, it suffered a drastic revision, but within seven months, more than thirty additional changes were found necessary. Since 1910, the Navy Department has witnessed a practically continuous succession of accounting boards, the result of whose deliberations

has been nothing but tinkering with the system, notwithstanding the fact that all such boards have realized the impossibility of obtaining satisfactory results without a simplification of the Navy's appropriation methods. It is in principle a system designed for use with a single lump sum appropriation, and its complications multiply rapidly with diversity of appropriations.

The Navy Yard Division, established about eighteen months ago for the purpose of administering navy yards, has found that authoritative control of navy yards is impossible under existing department administrative conditions. Each bureau has an interest in navy yards, and it is the funds of the bureaus that enable the yards to operate, but no one bureau has complete control over anything in any yard, not even its own funds. Practically everything the Navy Yard Division has to do must first receive the approval of at least three, and sometimes five, bureaus. No organization, military or commercial, can operate smoothly and efficiently, lacking a single directing agency, armed with authority and power. "In a multitude of councilors there is wisdom," but not in a multitude of masters.

It is unfortunately the general opinion that these and other difficulties under which the Navy now labors, all of which directly or indirectly affect our fleet, are new and are caused by the reduction in naval appropriations since the war. This is not true. Lack of money has not caused the difficulties. They have existed for a long time. But the receding tide of naval money has exposed them to view, and permits their magnitude and importance to be gauged in a way that was not possible when generous appropriations were the rule. Lack of money is only one of many conditions that the Navy has to meet and overcome. The difficulty in meeting the conditions imposed by the present reduced naval appropriations is due to lack of proper organization and lack of logical administrative methods. A 1925 navy yard cannot be efficiently administered by an 1842 Navy Department.

If the existing congressional economy has served to bring into prominence any defects in the administration of the Navy, and if the Navy Department takes steps to remedy these defects—then both the nation and the Navy will be the gainer, and the Navy can thereafter, without being hampered by the unnecessary restrictions due to such defects, address itself with a greater meas-

ure of success to its work of providing and maintaining a navy that shall be second to none in efficiency and economy of operation.

The difficulties under which the Navy Department is now laboring have to do with

The Appropriation System,
Navy Yard and Departmental Organization,
Administration,
Accounting and Cost Keeping.

An analysis of the history of naval administration will show not only how closely these subjects are inter-related, but will point the way toward the correction of any defects that may be found to exist.

Historical Sketch.—In 1842 the beginning of the present bureau system was established in the Navy Department, replacing a government by Navy Commissioners. In 1862 the number of bureaus was increased, partly due to war conditions and partly due to the advent of steam as a propulsive agency for naval vessels. This bureau system has endured, with little modification, to the present day. This system has many advantages, and prior to 1909, although subjected to many criticisms, it undoubtedly worked, and worked well. In its essence it consists of a number of equal and coordinate chiefs, each charged with specific duties concerning the acquisition, supply, repair, manning and operating of ships and shore stations. Differences of opinion and overlapping of duties naturally gave rise to controversies, (sometimes acrimonious but generally amicable), which required settlement, and the only power authorized to settle such questions was the Secretary of the Navy, a civilian. Many such questions were of a highly technical nature, wholly outside the training or knowledge of the civilian secretary, and it might be supposed that the record would disclose a long series of blunders due to this fact. Such, however, is not the case. Custom, tradition, and perhaps the innate integrity of naval officers, and their long familiarity with it, have fortunately prevented the serious difficulties which might well result from such a system. Whatever the defects of the system, which has been characterized by one of the bureau chiefs as "of unsurpassed crudity and ease of device" (Commander F. E. Chadwick in 1894), it worked—prior to 1909.

Prior to 1909 each bureau had, as now, its own separate appropriations for defraying all expenses incident to the performance of its duties as prescribed by the Secretary of the Navy and included in the wording of the appropriation bills. At navy yards each bureau was represented by a yard department, practically complete in itself and capable of performing all of the work under the cognizance of its corresponding bureau. The total expense of each such yard department was borne by the proper appropriations of the bureau of which it was the agent. Thus in the early days there was an unbroken chain of authority, responsibility and funds. The yard department was responsible, nominally through the commandant, to its own bureau and to no other; and the bureau, supplying funds to its corresponding yard department for the execution of work ordered only by that bureau, thus had complete control over its work and finances.

Prior to 1883 when the new Navy was started with the famous White Squadron, there was little difficulty at yards or in the Department. The lines of demarkation between bureaus were definite and fairly logical. One bureau built the ship, another rigged and equipped her, another supplied the machinery, and another installed the guns. Note also that practically all ship appliances except steam engines were hand operated. Guns were hand operated, boats hoisted by hand, anchors handled by hand, sails and spars handled by hand, the ship was steered by hand, and all illumination was by oil lamps and candles. With the White Squadron, however, came a marked change, due wholly to the progress in the art of shipbuilding. Ships were to be built of steel, sails were disappearing, mechanical devices were replacing manual power, electricity was used for illuminating and for power—all with the inevitable result that the simple yard departments, one of which dealt with wooden hulls, another with cordage and canvas, and another with cast iron guns on wood carriages, were forced, to keep pace with the times, to enlarge their activities and provide means for working in the mechanical era. This development reached its climax in 1909. The condition at our navy yards about that date was astonishing. Each yard department was to all intents and purposes a complete navy yard in itself, each having its own foundry, its own machine shop, its own blacksmith shop, its own carpenter shop, and even its own separate power plant.

This excessive duplication of expensive facilities was naturally productive of waste and inefficiency, and as early as 1894 thoughtful naval officers pointed out the desirability of correcting this state of affairs. It was not until 1909, however, that actual consolidation of navy yard activities was accomplished by order of Secretary Newberry. This action was undoubtedly largely influenced by the commercial tendency to consolidate and combine similar activities with resultant economies. It was the era of trusts and big business.

Thus in the two instances just discussed the Navy changed inevitably to conform to economic conditions. The growth and development of the yard departments corresponded to the industrial development of steam and electric devices, and subsequent consolidation of similar shops also closely followed the best industrial practice. In neither case can it be fairly said that the Navy anticipated recognized methods or that it lagged unduly in adopting them. It simply conformed to the changing times. These facts are emphasized to show that in any large organization such as the Navy, changes must be the result of evolution, of gradual growth, if they are to endure. They must reflect the best in commercial, industrial and military methods. Sudden upheavals, radical changes based on the opinion of one man, can seldom stand the test of time. The Navy should grow as a plant or an animal organism grows, steadily, slowly, surely—adapting itself little by little to meet the changed conditions with which it has to deal. The consolidation order of 1909, although it appeared drastic, was not unexpected. In 1902 the first move was made to provide central power plants; a few years later the equipment department at navy yards was merged with other departments; and the final consolidation order of 1909—the so-called "Newberry Plan"—was the culminating step in a program that was inevitable if the navy yards were not to continue to waste energy, effort and money.

This change in navy yard organization in 1909 is of fundamental importance in any discussion of present conditions. Upon it have been grafted many changes of greater or less importance, and to it, although it has been of incalculable benefit, can be traced many of the difficulties now confronting the Department. It marks the first departure from the definite control by bureaus of definite yard departments which expended only their own

bureaus' funds. Navy yard consolidation broke, for the first time in over sixty years, the solid chain of authority, responsibility and control of funds that had been the real support of the old system.

Let us outline briefly certain conditions existing just prior to 1909. Consolidation of stores had been already affected. Each yard had a general storekeeper. The naval supply fund had been established as a necessary device to permit the purchase and keeping of a general stock of supplies, which when drawn out for use were paid for by the specific appropriation using them. This naval supply fund was not real money; it was a bookkeeping fund, corresponding to the sum total of all the Navy's appropriations, a sort of suspense account into which each separate appropriation would eventually pay its share. The actual money used in buying stores came from the general account of advances, another fund or suspense account, which was simply the Navy's drawing account with the Treasury. Naturally all moneys disbursed under general account of advances have to be eventually reported back to the Treasury as charges against specific congressional appropriations; but for simplicity, to avoid each paymaster having to carry a separate bank account for each appropriation, this drawing account (general account of advances) was established. Two points should be noted here; that the general account of advances and naval supply fund are both suspense accounts, and that they were not needed until the number of appropriations to be handled by one agency became numerous. They are financial or bookkeeping devices pure and simple. They simplify the handling of many sources of revenue, but they do not and never can, of themselves, produce economies other than a possible saving in clerk hire.

Accounting, as we now understand it, practically did not exist at navy yards prior to 1909. Cost-keeping in the modern sense of the word was unknown. In only one department was any attempt made to distribute even a portion of overhead expense. Generally speaking, the cost of a job consisted of labor and material only. In most instances the time of supervisors was charged directly to jobs, with the usual result that the big jobs got all of it and the little jobs got none. Clerks, power, repairs to machinery, cleaning up and many other items of overhead expense were generally charged to specific job orders. From a

trained accountant's point of view this was inexcusable, and it is true that if the navy yards had been selling their work on the basis of their cost records they would have promptly gone bankrupt. But on the other hand it was simple and it served the purpose. Each yard department kept track of what it paid for power, for clerks, for plant repairs, and the direct labor and material for work on board ship. Yards and docks kept track of what it cost to keep the yard as a whole repaired and maintained. Each department's charges were distinct from the others and were debited against its own appropriations. Nothing more was needed nor desired before the consolidation of 1909.

After consolidation, however, there was a very different state of affairs. The old independent system of cost-keeping and accounting would no longer suffice. There was a central power plant delivering power to shops which worked for many different appropriations. What share of the cost of power should be borne by each? There was one machine shop doing work under several appropriations, what share should each bear of machinery repairs, supervision, cleaning up and the like? Obviously some method had to be devised which would equitably distribute these indefinite, but none the less real, expenses among the appropriations which benefited thereby. Note the similarity of this situation to that which led to the establishment of general account of advances and naval supply fund; consolidation of activities with diversity of appropriations. The method adopted to meet the difficulty was the same as in the former cases, a suspense account, called the overhead, to which was charged directly all expenses, as distinguished from direct labor and direct material. The monthly total of these expenses was spread out or "pro rated" over the various productive jobs and appropriations at the end of each month. The basis of this proration was, generally speaking, productive labor; that is, the overhead was distributed as a percentage of the direct labor to appropriations and job orders, but by the very nature of things this distribution could not be made until after the end of the month because the total overhead to be thus distributed could not be known until the month's charges to overhead had been added up. The overhead, therefore, was a suspense account, distributed monthly. This arrangement involved a definite relation between expenditures and costs, in that the total of all costs for the month

necessarily had to equal the total of all charges against appropriations (the expenditures), and these expenditures from appropriations could not be determined until long after the end of the month. (In passing, it may be remarked that this tying up of costs with expenditures from appropriations has been the cause of many of the complications of our accounting system.) The amount of these overhead expenses averages nearly one-third of the principal appropriation allotments to navy yards.

Summarizing navy-yard conditions after the consolidation of 1909 we find the physical activities concentrated into two main groups, the public works department or group, charged with the general maintenance of the yard, and the industrial department with two divisions, hull and machinery, which handled all of the productive shops. Recently the whole industrial department has been placed in the hands of the manager and the separate hull and machinery divisions have practically disappeared. From the financial point of view we find an accounting system, originally intended to operate under a single navy yard appropriation, which because of the necessity of operating under many appropriations, has become extraordinarily complicated and costly. It depends for its success upon the accounting device of a suspense account for overhead. Similarly the consolidated stores system, likewise forced to operate under many appropriations, depends for its success upon the accounting device of a suspense account for stores, the naval supply account. The cost of the resulting complications is high. For the fiscal year 1921 the cost of accounting and storekeeping at navy yards amounted to about twenty-five percentum of the productive labor, $12,000,000 compared with $49,000,000.

At the Navy Department no corresponding change has been made. The bureaus, separate as heretofore, are forced to deal with radically different conditions at navy yards. The bureaus no longer have their corresponding independent departments, each performing work for its own particular bureau, and representing it. Regulations provide that there shall be but one representative of the bureaus at the yard; namely, the commandant. No one bureau has final say as to arrangements, methods, repairs, etc., in the machine shop or in any other shop. Furthermore, one dollar out of every three allotted to yards is charged to overhead

which is not controllable by any bureau. There is a serious violation of the principles of administration in this state of affairs. The chain of authority, responsibility and control of funds has been broken. The bureaus are still responsible for their funds, but they have no authority over the expenditure of one-third of them. The navy yards have full responsibility for the work they perform, but there is no central authority to which the manager can look to provide him with funds and directions. The manager receives orders from all bureaus, and not infrequently the orders are conflicting and the funds are not in accord with the orders for work. The navy yards are operating with a 1922 organization under a Navy Department with an 1842 organization.

This violation of principle, the separation of authority and responsibility, was probably recognized in 1909 when the Secretary combined the Bureau of Steam Engineering with the Bureau of Construction and Repair. This combination was adjudged illegal, however, and was abandoned after a few months. In any event, it did not go far enough because it did not combine the money into one appropriation. This concentration of money for navy-yard operation is essential. Authority over navy yards must carry with it the means for making that authority effective. The means are, of course, the funds, since all navy-yard activities depend absolutely upon the money available to pay for labor and material.

The violation of principle caused by the failure to change Navy Department methods to correspond to the 1909 change in navy-yard organization did not cause much trouble until after the World War. From 1909 to 1918 the Navy's appropriations were steadily increasing, and it is a fact that practically any scheme can be made to work with plenty of money. After the war, however, with the inevitable reduction in naval activities and naval appropriations, there arose conditions which are taxing the ingenuity of the Department to meet without sacrifice of efficiency. Reduced funds require closer watch of expenses if deficiencies are not to be incurred. To get as much work on board ship as possible out of reduced funds involves among other things, reduction in overhead rates. With fewer ships being repaired at navy yards, and no building work, the balancing of the work load at yard becomes increasingly difficult. One ship will have a lot of engineering work and no construction and repair work. The next ship will be just

the reverse. For more than a year the yards have been resorting to every device in the attempt to obtain work that would provide steady employment for their reduced forces. On the East Coast this condition is particularly acute. The accounting system was revised on July 1, 1922, along the lines of charging many more items direct to appropriations instead of to "overhead." In less than six months over thirty modifications in this revision were made. The accounting system as it now stands is unsatisfactory to all. Especially does it fail as regards cost records, which are of such a nature and available only at such a late date as to be valueless to the manager for administrative purposes.

The newly established Navy Yard Division, the technical bureaus, and Naval Operations have been engaged for many weary months in the attempt to meet the President's call for "economy with efficiency," hoping that closer control over the scanty dollars available may still enable us to maintain our reduced Navy in an efficient state. It has perhaps been generally assumed that lack of money is the cause of our difficulties. Not so. Lack of money is the condition to be met. The difficulty in meeting it is the impossibility of authoritative control so long as the present divergence exists between the organization of the Navy Department and that of the navy yards. One or the other must be modified. That of the navy yards follows the best industrial practice and is a logical evolution which has followed the development of the mechanical arts and industries during the past forty years. That of the Navy Department has not kept pace with these changes, and should be brought up to date.

No disastrous upheaval is required, no change in the bureau system *per se;* no reduction in the number of bureaus. What is required, however, is a redistribution of duties among bureaus so that they will conform to existing conditions in the Navy, and so that each bureau may regain full authority over its funds, accept full responsibility for its duties, and be given definite agencies for accomplishing those duties. The broken chain of authority, responsibility and control of funds must be restored, and this restoration will produce extraordinary simplifications and automatically cause to disappear the great majority of the administrative and financial problems that now seem incapable of solution.

Proposed Remedy.—An idea of the changes necessary to be made in the methods of naval administration has already been given in the preceding historical discussion. Before outlining these changes in any detail, however, it is well to state the principles that must be adhered to if the difficulties previously described are to be eradicated with a minimum of changes.

(1) Authority and responsibility must lie together.

(2) With the authority must necessarily go the means for making such authority effective, be it money, personnel or what not.

(3) Each producing or executive activity of the Navy must have one single source to which it shall look for orders, instructions and funds.

(4) These activities must be grouped into classes, each one of which is engaged on similar work instead of being grouped according to the present artificial lines of bureau cognizance and the appropriation system.

(5) In de-limiting the extent and authority of each such activity, actual existing physical conditions shall be given great consideration. Accordingly, geographical boundaries must be sometimes used to indicate the lines of demarkation between dissimilar activities.

(6) Expenditures must be absolutely distinct from costs, and expenditures must be recorded and accounted for at the time disbursements are made. Appropriations shall be so arranged that all disbursements can be charged direct to them at the time they are made.

(7) Work done for other activities shall be financed by the appropriation of the activity performing the work, and reimbursement will be made on the basis of the cost records. Any gain or loss due to such "sale" of work will be borne by the appropriation of the activity performing the work.

(8) Expenditures for material shall be made against the proper appropriation when the disbursement for its purchase is made. Thereafter issues of material so obtained shall be for "use" only and the recording of material prices when issued for "use" shall be for cost or administrative purposes only.

(9) Changes in existing conditions shall be confined to the minimum necessary to comply with the foregoing principles.

The application of these principles means roughly this: that

there shall be one bureau having complete charge of all navy-yard activities and each navy yard will operate under one appropriation only, as allotted by that bureau; that there shall be one bureau in charge of all naval hospitals, and that the naval hospitals will obtain funds only from that bureau; that all ordnance plants, magazines, ammunition depots, etc., will be controlled by only one bureau and that bureau's funds alone will be expended by these activities, etc. Where several of these activities are located at the same naval station, geographical limits will be prescribed within which each activity will operate, maintain and repair its facilities and pay all expenditures for such work.

To accomplish these ends, it is simply necessary to make a corresponding redistribution of the duties of the bureaus of the Navy Department. Note that this is a *redistribution* only. There is no reduction in the number of bureaus and no diminution in the duties, responsibilities and opportunities for members of the staff corps, technicians and specialists. In fact, such opportunities will actually be enhanced rather than curtailed.

It is proposed to establish a new bureau in the Navy Department to be known as the Bureau of Maintenance. This bureau is to combine such of the duties of the present Bureaus of Engineering, Construction and Repair, Ordnance, Yards and Docks, Navigation, Medicine and Surgery, and Supplies and Accounts, as relate to the operation of navy yards, and the navy-yard work of building, repairing and altering of ships; and the obtaining, maintaining and issue of all material and supplies, save certain excepted material; namely, special ordnance material, special aviation material, medical and surgical supplies and material, provisions and clothing. This bureau will control one appropriation, to be known as "Maintenance," which appropriation shall pay for all navy-yard labor, the cost of all material purchased (except those classes just mentioned), and the care, custody, repair and issue of all material and supplies at navy yards, without exception.

From what is left of the Bureaus of Engineering and Construction and Repair, there will be formed a new bureau to be known as the Bureau of Design. This bureau will have charge of the design, procurement and inspection of new ships for the Navy. The appropriation to be controlled by this bureau will be "Increase Navy." To avoid unnecessary changes, it is proposed to exclude from this bureau's duties design matters now handled by the Bu-

reau of Ordnance: namely, armor and armament. The Bureau of Design will make contracts for the construction of new vessels with private shipyards or, with the approval of the Secretary of the Navy, will order such new vessels to be built at navy yards. In such case, the navy yard will bear the same relation to the Bureau of Design as does the private shipyard. The funds for shipbuilding at navy yards will be obtained by transfer from "Increase Navy" to "Maintenance," so that all disbursements at navy yards may be made from "Maintenance." The amount of such transfer shall be based upon the cost of the navy-yard work as determined by the cost accounting system. The Bureau of Design will pay for and have charge of the offices of the inspector of machinery and the superintending constructor at building yards, and will make such arrangements as may be desirable with the Bureau of Maintenance for the inspection of vessels building at navy yards.

It will be noted that the Bureau of Maintenance has cognizance over all repairs to plant facilities and public works at navy yards, and the maintenance of the yards, including such work as is now under the cognizance of the Bureau of Yards and Docks. From what is left of the Bureau of Yards and Docks, there shall be formed a new bureau called the Bureau of Public Works, which shall have charge of the design, procurement and inspection of new public works. This bureau will have control of the funds under appropriations "Public Works, Navy." It may let contracts with commercial concerns for new public works, or may have them constructed by navy-yard labor, subject to the approval of the Secretary of the Navy. The Bureau of Public Works will be similar to the Bureau of Design in its activities, except that the Bureau of Public Works will deal with shore facilities and dry docks, instead of with ships.

Practically no change is to be made in the present Bureau of Ordnance, except that all navy-yard work heretofore under the cognizance of the Bureau of Ordnance will be transferred to the cognizance of the Bureau of Maintenance, including the care, custody and repair of special ordnance material in store, and the cost of repairs, alterations and installation of ordnance material on board ship. The Bureau of Ordnance will retain the control, and pay the expenses of operation, maintenance and repair of all ordnance plants. Such plants shall include the gun factory, the tor-

pedo station, magazines, ammunition depots, mine depots, etc., and those to be under the cognizance of the Bureau of Ordnance shall be specifically listed and approved by the Secretary of the Navy. (NOTE: The scheme proposed herein for the redistribution of bureau duties and especially for the operation and control of navy yards follows almost exactly the control and operation of ordnance plants which has proved so successful in the past. Such plants owe their success in no small measure to the fact that they are controlled by one bureau only and have been operated under one, or at least, very few different appropriations.)

The Bureau of Navigation remains practically the same, except that the purchase, care, custody, navy-yard repair and issue of navigational instruments and supplies is transferred to the Bureau of Maintenance. No change is to be made in the instrument repair plant and adjustment plant at the Naval Observatory. Such chronometers, watches, sextants and other instruments as are cared for and repaired at the Naval Observatory will remain the property of the Bureau of Maintenance, but the operation of this plant and the expense of such work will be borne by an appropriation under the Bureau of Navigation. The Bureau of Navigation will have charge of all enlisted and commissioned personnel, including recruiting, training, education, promotion, re-rating and discipline. It shall have charge of all training stations, receiving barracks, the Naval Academy, the War College, postgraduate courses and special educational or training courses at commercial establishments. It shall not pay for, nor have charge of, any work performed by navy yards.

The Bureau of Medicine and Surgery will remain practically as at present, except that it will take over and pay for all maintenance and repair items heretofore under the cognizance of the Bureau of Yards and Docks or any other bureau.

Similarly, the Bureau of Aeronautics will be practically unchanged and will have complete control over and pay for all matters pertaining to the operation of aircraft factories, aviation stations, etc.

The Bureau of Supplies and Accounts will be changed to a considerable extent. The centralized purchasing of material that has proved so successful in the Navy Department will be retained, but such purchases will be determined as to necessity, time, quantity and quality by the Bureau of Maintenance, or the other bureau

under whose cognizance the material in question falls. The purchasing paymaster and the purchasing section of the Bureau of Supplies and Accounts will become purchasing agents who will centralize purchases, issue proposals, receive bids, and after approval by the bureau concerned, execute contracts or issue orders for such purchases. The store-keeping function will be transferred to the Bureau of Maintenance, including store keeping at naval supply depots. The determination of costs, having been absolutely divorced from any relation to appropriations, will also be transferred to the Bureau of Maintenance. After these changes, what is left of the Bureau of Supplies and Accounts will constitute a new bureau to be called the Bureau of Finance. The Bureau of Finance will have control over all appropriation accounting as distinguished from cost keeping, will make all reports and returns required by the Treasury Department, will execute all purchases as required by other bureaus, will make all disbursements, and will have charge of provisions, clothing and small stores, including the operation of the clothing factory. It is to be noted especially that with the exception of clothing, provisions and small stores, which are to remain under the Bureau of Finance for the purpose of avoiding too many changes, this bureau is confined to one which performs two principal functions: namely, purchasing and disbursing; that is, this bureau will deal with actual handling of money and the accounting for the disbursement of such money.

The following table shows a comparison of the present arrangement of the Navy Department with the proposed arrangement:

Present	*Proposed*
Secretary	Secretary
Assistant Secretary	Assistant Secretary
Navy Yard Division	Civil Personnel and Shore Station Division
Naval Operations	Naval Operations
Bureau of Navigation	Bureau of Navigation
Bureau of Ordnance	Bureau of Ordnance
Bureau of Medicine and Surgery	Bureau of Medicine and Surgery
Bureau of Aeronautics	Bureau of Aeronautics
Bureau of Supplies and Accounts	Bureau of Finance
Bureau of Yards and Docks	Bureau of Public Works
Bureau of Engineering	Bureau of Maintenance
Bureau of Construction and Repair	Bureau of Design

A brief summary of the principal duties of the proposed Navy Department offices and bureaus follows:

Secretary of the Navy—In general charge.

Assistant Secretary of the Navy—Duties as at present, including the departmental administration of navy yards and naval stations; inspections of navy yards and naval stations; civilian personnel.

Naval Operations—Preparation of plans for the use of the fleet in time of war; plans for the development of shore stations for use in time of war; operation of the fleet; final military authority concerning all questions of departmental administration.

Bureau of Navigation—Principally personnel, its procurement, training and detail to duty; schools, Naval Observatory, Hydrographic Office, ocean and lake surveys.

Bureau of Ordnance—All ordnance plants, special ordnance material; design of armor and armament for new ships.

Bureau of Medicine and Surgery—Health, hygiene and sanitation; operation of all naval hospitals; medical work on board ships.

Bureau of Aeronautics—All matters connected with aeronautics, including all special aviation material and the operation of aircraft factories and aviation stations.

Bureau of Finance—The execution of purchases and contracts for material and services ordered by all bureaus; handling and disbursement of all moneys; appropriation accounting (but not cost keeping); operation of clothing factory and procurement of provisions, clothing and small stores; does not handle store keeping.

Bureau of Public Works—Design and procurement of new public works.

Bureau of Design—Design and procurement of new ships, except armor and armament, which is under the Bureau of Ordnance.

Bureau of Maintenance—Operation of all navy yards and shore stations not assigned specifically to another bureau, including repairs and alterations of ships and their equipage; manufacturing work at navy yards; procurement (through Bureau of Finance) of all supplies and material, except provisions, clothing, small stores, special ordnance material, aviation material, and medical and surgical material; store keeping; actual construction of all new ships and new public works by yard labor; repairs and maintenance of navy-yard plant, structures and facilities.

Conformable to this redistribution of departmental duties there will be a redistribution of money so that the field activities controlled by each of the new bureaus will operate under the funds of one bureau only; for example, navy yards will use appropriation "Maintenance"; ordnance plants will use only ordnance funds; hospitals will use only medicine and surgery funds; training stations will use only navigation funds; etc. Furthermore the suspense accounts, naval supply account and overhead, will be abolished, and all expenditures for material purchased and for the operation of naval activities will be charged direct to the appropriations at the time the expenditure is made. Finally, as the result of these arrangements, costs will be wholly separated from any connection with expenditures and appropriations.

Operation of Proposed Scheme.—Under the proposed scheme the navy yard, that is, those activities at yards which are under the control of the manager (including a part of those under the captain of the yard), but exclusive of marine barracks, naval hospitals, receiving barracks, aviation fields, etc., will have one departmental agency to which to look for all orders and instructions, and one appropriation from that agency to defray all expenditures for labor and material (including overhead) for all purposes, including the purchase of general stores, operation of shops, wages of employees, repairs and alterations to ships, buildings, plants and facilities. This agency is the new Bureau of Maintenance, and its corresponding appropriation, "Maintenance" will defray all expenses of running navy yards.

This new bureau and its single appropriation is the keystone of the proposed scheme. It is the adoption of one such single appropriation which permits us to differentiate between expenditures and cost and does away with the necessity for retaining the two suspense accounts, naval supply account (naval supply account fund) and overhead expense. An expenditure under the new scheme will mean what it should mean: namely, an actual disbursement of real money from the Navy to some other activity. Moreover, the rearrangement of appropriations and bureau duties in the Navy Department is such that the appropriation chargeable will always be known at the time an expenditure (disbursement) is made. This means that expenditures for material will be debited against the proper appropriation when the bill for the purchase of

the material is paid, and that expenditures for labor will be debited against the proper appropriation when the employees are paid. Thus the disbursing offices of the Navy will make all expenditure reports without being forced to wait for tedious calculations from store-keepers or accounting officers before such reports can be rendered. The navy-yard pay roll will be a single roll, its total chargeable to appropriation "Maintenance." The material charges against "Maintenance" will be the public bills settled by disbursing offices.

What is the effect of this procedure on costs? As can be seen at once, costs are thereby removed from their existing combination with expenditures of real money and become what they should be, calculations having to do with the *use* of labor and material. The money paid for labor at the end of a pay period will be a definite expenditure, chargeable to "Maintenance." The value in dollars and cents of the same labor as utilized during the same period may be allocated as an element of cost to any job order or account. Material already paid for at the time of its purchase out of "Maintenance" will be withdrawn from store for *use,* and its value allocated as another element of cost to the proper job order or account. Since costs will no longer deal with real money, they need not, and will not, and should not, check with expenditures. Thus, the cost of a new lathe in the machine shop will be charged at several hundred dollars as an expenditure chargeable to appropriation "Maintenance," but for many years thereafter a portion of the value of this lathe may be included as depreciation in the cost of work performed on this lathe. This facility of including such an item as depreciation in cost records will remove one of the difficulties with our present accounting system. Similarly, such items as pay of officers, military charges, etc., which are expenditures from appropriations, may be with equal facility excluded from costs. The distribution of the "over" or "under-absorbed" expense at the end of the month to the allotments of the various appropriations will no longer be necessary and the accounting system will become a simple, logical device for calculating costs, such as it was originally intended to be. In passing, it may be noted that from the inception of the accounting system in 1909, nearly every one of the many boards that have been called upon to consider its revision and improvement have referred to the fact

that its expensive complications could never be avoided until a single appropriation replaced the many appropriations with which it now has to deal.

The navy yards (excluding the other station and district activities, such as marine barracks, receiving barracks, hospitals, recruiting stations, etc.), will be operated under the money of one appropriation, "Maintenance," which pays for all material purchased at the yard (except special ordnance material, medical and surgical material, aviation material, provisions and clothing) and for all civilian labor employed in the yard. This appropriation will by law be charged with the operation, maintenance and upkeep of navy yards and stations and all work performed by them, except those particular shore-station and shore activities specifically assigned to other appropriations. (Ordnance plants, naval training stations, etc.) Inevitably these other activities will desire work done for them at navy yards, and the yard should be able to perform without red tape or accounting complications any work from any source, inside or outside of the Navy, within their capacity. This can be accomplished very simply under the proposed scheme. Each yard doing work for other appropriations or outside parties will finance such work from "Maintenance" and will then actually sell the result at a price based upon cost records, including whatever profit, overhead charges or tool charges may be required by the accounting system. The sale will be accomplished by transfer of funds (or invoice) in the Navy Department. The simplicity of this method is obvious, and this simplicity is obtained by permitting the gain or loss involved in such transactions to be borne by appropriation "Maintenance," which becomes the working fund of the yard, comparable to the working capital of a commercial concern, and the sale of such work as is performed by the yards for other than their own legitimate ends will be made as a merchant sells his goods, perhaps at a profit, perhaps at a loss. Each job order for work other than maintenance work will contain a symbol indicating that appropriation "Maintenance" is to be reimbursed, and another symbol designating the source of the reimbursement, so that at the close of each month, or even more frequently, the status of the available balance under "Maintenance" can be quickly and accurately determined; in fact, a daily record can be kept if necessary to show these amounts receivable. The volume of such "reim-

bursable" work will be comparatively small, because all of the normal and ordinary navy-yard work will be under the cognizance of the Bureau of Maintenance.

The problem of store keeping is rendered equally simple under the new scheme. The naval supply account and naval supply account fund will disappear. Every article purchased will, by the time it is placed in store, have had its cost charged against the proper appropriation and there will be no further necessity of invoicing it back and forth through naval supply account until its final disposition has been determined. An extreme case under the present system is that of a certain pump which is reputed to have been transferred back and forth from naval supply account to appropriation "Engineering" no less than thirty-six times. Under the present system also certain classes of material when utilized in the so-called title "A" manufacturing shops have to be invoiced back and forth through naval supply account no less than three times before their value becomes a charge against the proper appropriation and job order.

The control of the material on hand and that to be purchased during any one fiscal year, is also rendered more effective. The record of balance of stores on hand will include only a few appropriations, and it will be easy to determine a proper percentage of the annual issues to form a basis for the value of the stock to be kept on hand at all times. The Secretary of the Navy and Congress can be kept informed of the status of material on hand in a stores account which will be exactly like the stores account and inventory of a commercial concern. That is, it will show the value on hand at the beginning of the year, that at the end of the year, and the acquisitions and issues during the year.

From the point of view of the ship in commission the proposed scheme offers many advantages. All material desired for use on board ship can be obtained from navy yards or supply depots on requisition, as at present. Issues will be made to ships for *use* just as though such issues were made to navy-yard shops, and the Department can control the economy of ships in their use of material and supplies by limiting them in the value of stores just as at present, with, however, the knowledge that such allotments and such limitations are merely administrative records and do not in-

volve any bookkeeping records that have to be adjusted to the naval appropriations and reported to the Treasury Department.

The consolidation of all navy-yard work under the Bureau of Maintenance will permit greater economy and much simplification by the combination of the separate offices or divisions in each of the technical bureaus which now deal with—

Materials	Requisitions
Stock	Plant improvements
Specifications	Ship repairs
Tools	Ship alterations
Supply	Allowance lists, etc.

because, under the new Bureau of Maintenance each of these questions will be handled as a complete whole, instead of being restricted to the present narrow confines of bureau cognizance. In fact, the vexed question of bureau cognizance will practically disappear.

The same general principle of the operation of navy yards will apply to the operation of other shore activities of the naval establishment. It will not be necessary to make any change in the present method of handling radio stations. Those now assigned to industrial yards will be handled as though forming a geographical part of the navy yard, while those assigned to so-called military stations, will be handled as though forming a part of such stations. The funds for the repair, operation, maintenance and alteration of radio stations will be the same as those allotted to the parent station.

Naval training stations will be under the Bureau of Navigation, which will pay for all expenditures necessary for their operation, maintenance, repair and improvement, out of a single appropriation. The appropriations "Engineering," "Construction and Repair," "Maintenance, Yards and Docks," etc., will no longer have anything to do with training stations, and the control of their activities will be through the medium of one single appropriation which will enable the Department to keep track of the cost of such activities in a way that is impossible at present.

The same remarks apply equally to such activities as receiving barracks, the Naval Academy, naval hospitals, etc. Each will have one bureau, and only one, to look to for orders and funds, and the records of the disbursement of such funds will constitute the cost to the Navy of the operation and maintenance of these activities.

THE INDEPENDENT AIR FORCE

By Lieutenant G. R. Fairlamb, Jr., U. S. Navy

NO ONE seriously questions that aviation has made remarkable progress in a short span of years and that as a factor in national life it is increasing in power. Its military value has been recognized from its inception and practically all of its development has resulted from military inspiration. It would be tedious and needless for the present purpose to sketch the history of our Army Air Service and Naval Aviation. It suffices to say that aviation has been accepted in varying degrees by the two services as a useful arm, has been given proper and improper consideration, and has been assigned an interest and importance in the scheme of the two services commensurate with the vision of the powers that be therein.

This vision has not always been clear and far-seeing. On the contrary it has frequently been otherwise. We have been groping and feeling our way rather than striking out boldly. Aviation enthusiasts and fanatics have not helped matters much —their negation of the "battleship backbone" doctrine which is the Navy's credo has not only been illogical but has bred suspicion and ill will. Consequently, the clear vision which calls for cooperation, for boosting naval aviation, for expanding it, for exploiting it to the limit of its possibilities as the only answer to this extremist school of thought, has been too often obscured.

Due to a variety of causes, perhaps all of them springing from the lack of clear vision on the part of senior officers of both services, the agitation for an independent air force is being felt with greater strength than ever before. The personnel of the Army Air Service is believed to be almost unanimously in favor of it, most probably because they are essentially aviators first and soldiers second, if at all. The majority sentiment among naval pilots has been in the past opposed to the idea, most probably because they are sailormen first and aviators

incidentally, and because most of them have had sufficient background of naval life, strategy and tactics, to believe that aviation to be useful to the Navy must be *part and parcel of the Navy*, but the sentiment of naval pilots is apparently changing in favor of the new scheme. Possibly the changing naval sentiment has accelerated the effort of the Army Air Service to effect consolidation, but be that as it may, present indications point to a revival of the issue to the extent of bringing it sharply before Congress and "investigating committees" during the coming session.

It therefore behooves every naval officer, and especially those in naval aviation, to take careful stock of the situation. It is the purpose of this article to suggest the issues involved, to give some of the reasons for the changing sentiment among naval pilots, and, if possible, to indicate the general broad principles for working a way safely out for the best interests of the Navy and naval aviation.

The real issue involved is simply this: "Shall aviation be given a free hand to develop most quickly to its maximum efficiency along the lines and theories of those who are *in* it and therefore know best its possibilities and its limitations, or shall it be hampered in its development and be made to conform to the theories of those who are only *with* it? Assuming that the people *in* aviation know what the people *with* aviation want and expect of it, is it not reasonable to expect better results if the former handle it with minimum interference? Yes, it seems reasonable in theory and the assumption on which it is based seems sound. In practice, however, it would not be so ideal as many think, for the reason that there exists a diversity of opinions and theories among the people *in* it.

The following aspects of the above issue exist relative to the control of naval aviation:

(a) Amount of money allotted.
(b) Manner in which spent.
(c) Control of personnel.
(d) Weight to be given recommendations of the Bureau of Aeronautics regarding movements of planes, squadrons, tenders, carriers, which may be briefly couched in the phrase: "control of aviation operations."

(e) Weight to be given Bureau of Aeronautics in design of carriers, tenders, and other types of vessels.

(f) Attitude of flag, commanding, and executive officers toward aviation personnel under their command.

At present there is no sharp dividing line in the handling of these items, as there is in the Marine Corps which, though a part of the Navy, is an autonomous unit. All of the above matters are handled in the "part and parcel" manner, and the method is unsatisfactory to both the air navy and the surface navy.

Otherwise, there would not be the changing sentiment swinging toward the independent air force. When from experience in working in double harness aviation feels that it is being hampered and held back, it is no wonder there is the desire to strike out boldly on its own, and this in spite of the excellent arguments recently advanced by Captain Johnson and Lieutenant Commander Herbster, who detailed in the clearest terms the folly of an independent air force. If we do not soon find a workable scheme for coordinating the development and operation of naval aviation with our normal service activities, we will surely fall before the attacks of the independent air force adherents.

As between the matériel and the purely personnel aspect of aviation, though the former is a great factor in causing dissatisfaction, the latter because of the personal equation probably contributes to it more. I refer to the attitude of senior officers in particular and all officers in general toward naval aviation personnel. There are a large number of highly intelligent and capable ex-reserve officers whose principal naval experience has been confined to flying. To expect them overnight to be salty and seasoned watch officers, navigators, etc., is unreasonable. In passing the examinations for their respective ranks they have shown not only loyalty to the Navy, but the necessary mental capacity for becoming good officers and seamen as well. They should be *judged* and *assisted* accordingly in their professional careers afloat. There is a tendency also on the part of the service at large to doubt the good faith of Naval Academy men who have entered aviation. A classmate of the writer's, who went to a certain catapult ship as aviation officer, was made to appear as the ship's "politician," treated accordingly, denied opportunity to fly his ships and hampered in his work. He disgustedly stated

that naval aviation was hopeless until the older crowd passed on. This was not an isolated phenomenon. It is an illustrative case in point, and many others could be cited.

It is of paramount interest that all officers in the service, and particularly those of flag, command and executive rank, consider aviation units in their commands as much a part of ship armament as their batteries and fire control installations. If this attitude is shared by all hands, greater harmony and cooperation must result and one of the best arguments for an independent air force at once loses its punch. The questions centering around the *actual control* of matériel, operations, personnel and the powers of the Bureau of Aeronautics are all debatable, but certainly the attitude to be taken by the surface navy toward the air navy is not.

On what common ground are we all to meet to settle the difficulties—the growing dissatisfaction, if you will, of naval aviation. None other than our common conception of the Navy, its purpose and its needs as modified by changing world conditions and discovery of new weapons and tactics. It is submitted that the best way to iron out the mechanical difficulties of aviation organization, administration and execution of policy, is in conference by the chiefs of bureaus, the commanders of fleets and fleet units, and the General Board. As far as the personal attitude toward aviation and its personnel is concerned, it is difficult to say whether the attitude is a result of tradition, opinion and theory, or whether it is a cause thereof—but it is easy to see that unless the personal attitude is sane there can never be cooperation. It is, after all, a personal matter with individuals and can only be reached through individual understanding of aviation—of its present limitations, its problems, its present capabilities, and its future possibilites.

Failure on the part of the surface navy properly to appreciate the air navy and to cooperate with it will disaffect naval aviation personnel to the point where it will be forced to choose between casting its lot definitely with a united air service or with the Navy. There remains a possible alternative which we have discarded once: viz., a naval flying corps similar in organization and administration to the Marine Corps, but that is a question for the suggested conference. In any case we must evolve a satis-

factory scheme for providing maximum naval aviation development and coordinating it with the Navy.

It appears to the writer that over and above the mooted question of an independent air force there is beginning to loom a fight between *air* power and *sea* power. No originality is claimed for the idea that air power is seriously endeavoring to encroach upon sea power. The fact is that the present assistant chief of the Army Air Service is sponsoring such a movement most vigorously. Air power is a real factor—and it is also a catchy phrase. To the man on Main Street, the Mitchell school of thought presents air power as meaning many planes whose cost and operation in comparison to the Navy will be small, whose power to defend our *continental* shores from attack will be sufficient and ample. The man on Main Street doesn't give a continental about our *outlying* possessions, our *world markets,* and our *national policies.* His horizon is limited to local affairs and why have expensive sea power when inexpensive air power gives him security at home? To the man with broader horizons the claim is baldly made on the strength of a world flight that air power can wage offensive oversea war, and this with the limit of internal combustion engine development almost in sight. Interest in air power threatens to overshadow that in sea power, and if it does, all the air power we might muster could not alone defend our Monroe Doctrine, our Open Door in China, and our Most Favored Nation treaties. Assuming that other nations correspondingly neglected or scrapped their sea power, we are stalemate. Otherwise, the United States as a world power will be a matter of history.

It is our duty to the man of Main Street and to the man of broader horizons, neither of whom has time for study of these problems, to prevent air power from displacing sea power. The first step is to combat heart and soul the idea within our *own* ranks of an independent air force.

JOINT ARMY AND NAVY OPERATIONS
PART IV

By Captain W. S. Pye, U. S. Navy

IN THE previous articles of this series, published in the Naval Institute Proceedings for December, January, and February, an endeavor was made to point out requirements of a general nature which must be fulfilled if efficiency in the conduct of joint operations is to be attained. These requirements include:

First: Mutual confidence between the Army and Navy.

Second: Effective cooperation between the War and Navy Departments.

Third: Joint basic readiness and joint basic operating plans.

Fourth: Joint training.

Fifth: Definite instructions relative to command.

In a sense, the fulfillment of the above requirements may be considered preparation for joint operations but they by no means include all of the preparation necessary to insure effective joint operations. It is the purpose of this article to consider some additional preparations required for a specific joint operation.

Detailed preparations for an overseas expedition can be commenced only after certain definite decisions have been made. These include:

(a) *The theater of operations.*
(b) *The strategical objective.*
(c) *The nature of the command.*
(d) *The strength of the army and navy forces to participate in the expedition.*
(e) *The rate of reinforcement and of replacement of troops, equipment and supplies.*

Before undertaking a discussion of detailed preparations it is considered desirable to indicate by a general discussion, the nature of these preparations and the necessity for their effective accom-

plishment and to cite some historical incidents which show that failure in making effective preparations may jeopardize success.

The operations of a joint expedition across the seas differ materially from the normal operations of either an army or a fleet operating alone. From the point of view of the fleet there is the necessity of guarding the transports; the decrease in mobility and maneuverability due to the convoy, with its probably inferior speed, handiness and radius of action; and the necessity for the employment of at least part of the naval force in the operations incident to the escort of the convoy and to the assistance to be given the army in landing, while at the same time insuring command of the sea. The army, too, is faced with a different problem from the usual one of operating on land from previously selected bases of operations. In an expedition overseas the army is projected into enemy territory from the sea, and all of its personnel, equipment, stores and supplies must accompany it or be transported later across the seas. In operations of this type deficiencies cannot be quickly remedied; reinforcements are not readily available; equipment and stores must be landed with the troops and to accomplish this efficiently the greatest care must be exercised in planning so as to make everything available when required.

Operations of this character require the most painstaking and carefully studied preparation. Unless the required forces, the amount and type of equipment, the amount and assortment of stores and supplies, and the quantity and quality of provisions are determined with the greatest accuracy there is danger that in the midst of the campaign the means will be found inadequate to the accomplishment of the task.

Although it is well recognized that preparation for any and all of the operations of war is frequently the determining factor in victory, there is no type in which efficient preparation is so thoroughly rewarded as in joint operations. Judging by history there is probably no type in which, in the past, preparation has been less thorough. This condition, although regrettable, is not strange. Cooperation within a single department is very frequently hard to obtain and between two departments many times as difficult.

This lack of thoroughness has been due largely to the haste with which joint expeditions have been organized and started upon their operations. Haste in decisions requiring such complicated and

difficult operations is usually a result of an absence of plans, and absence of plans is due to lack of foresight or administrative inertia, neither of which is justifiable or excusable.

As we progress in the analysis of the preparations required to make joint operations effective it will become apparent how great is their importance. It would be possible to write many chapters on the details of such preparations, but for the purpose of discussion in this article the subject will be treated under three main headings as follows:

(1) Preparation of information pertaining to the enemy and to the theater of operation.

(2) Preparation of army forces.

(3) Preparation of naval forces.

(1) *Preparation of Information Pertaining to Enemy Strength and the Theater of Operations.*—The acquisition, arrangement and distribution of information pertaining to the strength of the enemy and to the characteristics of the theater of operations are essential to the effective conduct of war.

It seems almost too elementary to mention that every endeavor should be made to ascertain the strength of the enemy forces to be opposed; their state of discipline, morale and training; the nature of their equipment, amount and caliber of their artillery and the location of fixed defenses, etc., yet history shows that information of this nature has been wanting on many occasions. It is no doubt true that in the past such information was harder to obtain and to transmit than it is today, but, even allowing for this, it is impossible to believe that the absence of information on the part of the commanders of some expeditions has not been due in large measure to lack of foresight.

Information in regard to the enemy force, its equipment, etc., may, of course, be in error, due to changes which in war may be rapid; but much of the information required for successful operations relates to the nature of the terrain, the location of roads and railroads, the favorable landing places, the climate, prevalence of storms, location of anchorages, etc., which do not change rapidly, if at all.

It is the duty of every commander to engage the enemy under conditions as favorable to himself and as disadvantageous to the

enemy as the conditions permit. Information of the enemy's strength, disposition and movement, and of the physical characteristics of the theater of war, is vitally necessary to a commander on whom rests the responsibility for deciding the time, place, advisability and manner of conducting an operation of war. Much of this necessary information can and should be obtained during peace, for a declaration of war or the outbreak of hostilities is immediately followed by a cessation of the flow of information through usual peace channels. Indecision or delay, caused by waiting for information before acting, may be fatal to success.

Information is the ground work upon which plans are constructed. Accuracy is vital, but the most accurate information is of no value if not received in time. Accurate, timely information bestows the power of initiative, which, if properly used, may be the decisive factor in a campaign. Absence of information frequently causes confusion and hesitancy which ultimately lead to defeat.

The absence of information regarding the theater of operations at the time of the British and French attack on Sebastopol in the Crimean War is well shown by the following quotation from Hamley:

"It was as completely an unknown country to the chiefs of the Allied armies as it had been to Jason and his argonauts when they journeyed thither in search of the Golden Fleece. It was known to contain a great harbor and a city with docks, fortifications, an arsenal, but the strength and resources of the enemy who would oppose us, the nature of the fortifications, and even the topography except what the map could imperfectly show, lay much in the region of speculation."

Not only was there a total absence of information as to the strength of the enemy and the nature of fixed defenses of Sebastopol, but apparently there was neglect to consider the nature of the terrain; the most suitable landing places and anchorages; the climatic conditions, the prevalence of disease, and the facilities required for feeding the army and furnishing the necessar transport on shore. This failure caused untold suffering, and against a more energetic and resourceful enemy might have resulted in defeat. The troops had no warm clothing to withstand the damp cold weather of winter; there was a shortage of medicines and only meager arrangements for handling the sick and wounded; the

commissary arrangements and the transportation of supplies on shore almost completely broke down because of failure to anticipate the needs and to provide officers of experience to handle the very difficult situation.

As has been indicated by the above remarks relating to the campaign in the Crimea, the information in regard to climatic conditions and as to the nature of the terrain is most important. Troops must be supplied with clothing suitable to the variations in climate they will experience. Transportation for use on shore must be suitable to the nature of the terrain.

The study of terrain for a joint expedition must be more thorough than that for either a purely fleet operation or a purely army operation.

The nature of the terrain has an important bearing upon the method of attack. The method of attack to be used bears directly upon the organization of the attacking force, the proportion of each of the various arms, and the nature of the weapons to be used, especially as to the type of artillery.

The terrain has an important bearing upon the nature of transportation to be provided for landing. In the Zeebrugge expedition the existence of a mole provided means for landing directly from the transports, whereas at Gallipoli all troops, except a few from the *River Clyde,* were landed in small boats. The means of transportation to be used in landing troops is a naval matter, but unless practical experience is obtained by joint exercises efficient means will not be developed.

For joint operations the study of terrain does not stop with the shore line. On shore the nature of the terrain has a vital bearing on the type of transportation to be provided for the army. Horses are difficult to transport by sea and, where possible, should be replaced by motorized transport. In some places motorized transport might be worthless. In many expeditions there has been a failure to provide transport suitable to the terrain of the theater of operations.

Naturally there are many more decisions that depend upon the information concerning the enemy and the theater of operations, but enough has been said to show that this information must be diligently sought and conscientiously used if the expedition is to be prepared to operate efficiently. All of the information is

perhaps not essential to both the army and navy, but, as it is impossible to tell just what information may be useful to each, all information available to one should be furnished to the other.

(2) *Preparation of Army Forces.*—Situated as is the United States with no powerful nations within 3,000 miles, there is little danger of invasion if the Navy is maintained in efficient condition and of a strength permitted by the Treaty for the Limitation of Naval Armament.

For many years previous to the Spanish-American War our Army had been looked upon purely as a defensive force. Its primary duties since the Civil War had been the suppression of the Indians in the Western States. With the necessity for expeditionary forces which arose in the war with Spain we were not prepared to cope, and the history of the Santiago de Cuba Campaign should be studied as a horrible example of lack of preparation.

As a result of the Spanish War and the later increases in territorial possessions the United States is now responsible for the protection of possessions thousands of miles from home territory, including the Panama Canal which is vital to our prosperity. This change in the situation, while it has been recognized to some extent by the assignment of garrisons to our outlying possessions, apparently has not been fully recognized in the organization of the Army in the United States.

For hundreds of years the British have depended upon their fleet to insure protection of the home country against invasion, and they have maintained a regular army primarily for use in expeditions in defense of their colonial possessions. It seems to the author that the time has arrived when the United States should adopt a similar policy.

Such a change in policy would require a change in the present distribution of the Army. At present the Army is widely distributed all over the United States with a view to training the National Guard and Reserves. While such training is necessary, the history of nations having oversea possessions indicates that the primary duty of the regular Army should be recognized as the protection of our outlying possessions, and for this purpose we should maintain a large part of the Army as an expeditionary force capable of rapid movement.

The first activity in the preparation of an expeditionary force for a specific strategical objective is its organization. The organization must provide for:

(a) *The command.*

(b) *The total strength and the assignment of proportions of the various arms.*

It has not been the policy of the War Department to designate during peace, the officer who is to command the armies in war. Perhaps this is logical, as under the present organization there is no large unit concentrated for immediate service in war, and it is assumed that the variation in the possible size of army expeditions which might be employed in various situations, would make such assignment difficult.

The advantage which the Navy possesses in having the commander-in-chief of the fleet assigned during peace is very apparent when planning is considered and it is believed that should the Army organize an expeditionary force an officer should be selected and appointed as commander of the expeditionary force, and furnished with an adequate staff to permit him to study possible operations.

In the absence of such commander and staff it devolves upon the War Department General Staff to determine upon the size and composition of the expeditionary force. Having determined upon its size and composition the General Staff must decide which troops shall comprise the force. Many things must be considered in making this decision.

Troops selected for an expeditionary force, so far as practicable, must be selected for their efficiency.

In expeditions across the seas there is no time to train troops; there will be no preliminary skirmishes in which troops may be seasoned; it is more than possible that the first day's fighting may be the decisive one. Raw or poorly trained troops cannot expect success under these conditions. The troops selected must be the most efficient and must have been trained in the conduct of joint operations. Unless an expeditionary force organization is adopted by the Army it is difficult to see how the troops can receive this necessary training.

The expeditionary force should be organized in small divisions, each division comprising a suitable proportion of all arms.

The Japanese Army, which has been unusually successful in joint operations, has used an organization by small divisions, each division being composed of elements of all arms. This type of organization is flexible and lends itself readily to meeting conditions which may have changed while the troops were in transit.

In embarking, this system of organization should be followed so far as practicable in order that the loss of one transport shall not deprive a division of all the units of one arm, such as artillery.

Troops selected for expeditionary force assignment should be kept concentrated and suitably disposed with regard to embarkation ports and most efficient lines of transportation.

If an expeditionary force organization should be put into effect during peace, the troops designated should be concentrated by divisions for training and to facilitate movement. If no such organization is effected during peace the selection of troops will be influenced by the disposition of available units. The units should be selected during peace and computations made to determine the periods of time required to concentrate troops for various sizes of expeditionary forces at embarkation points on each coast.

Railroad transportation might be simple if the movement of troops were the only requirement placed upon the railroads, but it must not be forgotten that at this same time the equipment and stores for this force as well as men and materials for the Navy will have to be transported, probably to the same ports.

The rush to get men and materials to France during the World War resulted in congestion of the entire Atlantic seaboard. If transportation is to be rapid and efficient, a transportation plan for the Army and Navy must be worked out in detail.

Equipment and Transportation Required.—The requirements of an expeditionary force as to the equipment and transportation should be carefully computed and plans made to provide this material and means of transportation at the embarkation ports by the time the troops arrive.

The total strength and proportion of various arms having been decided upon it is necessary to determine the equipment and transportation required. The standard equipment for army organizations has been tabulated but this must be carefully examined as to its suitability for the conditions under which an expedition is to

operate, and, if necessary, modified to meet the anticipated local conditions.

From the materials on hand there should be no difficulty in obtaining the equipment for any expeditionary force of the maximum size which can be transported in the available vessels of our Merchant Marine. To be sure that this equipment will be ready for embarkation with the troops requires planning and this type of planning can be better done during peace than later. There should be definite plans for the rapid equipment of an expeditionary force at embarkation ports on either coast.

The transportation required for the expeditionary force is of two types—sea transportation and land transportation. For small expeditionary forces, in cases where enemy naval strength is insignificant, the expedition, although it may be under naval escort, can hardly be assumed to be in the nature of a joint operation. In such cases the Army Transportation Service should furnish sea transport. In cases where naval opposition is expected, the necessity for position keeping, and maneuvering, and the probably greater number of transports, requires that the Navy shall furnish, and as far as possible man the transports.

The provision on short notice of suitable transports for a large expeditionary force is not an easy matter and requires much careful planning. While the first consideration is tonnage, there are many other considerations, such as availability, radius of action, speed, fresh water supply, boat equipment, draft, etc., which have an important bearing upon the selection made. The final decision must be a compromise, but planning can insure an acceptable compromise.

For operations of this character the Army General Staff should determine the tonnage required both in weight and cubic capacity, after which the Navy should make a tentative selection of vessels to be used as transports. The Army Transportation Service and General Staff should then study the characteristics of the ships tentatively selected to determine the units and stores which each transport can carry. Substitutions may be required. How much better to determine this by planning in advance than to find it out as the ships are loading.

Attention must also be paid to the operations contemplated upon the completion of the voyage. A situation in which troops must make a landing from transports against enemy opposition requires

the most careful assignment of units to transports and the most careful loading of equipment in order that it may be available as needed.

In the transportation of our Army and its stores to Europe in the World War little attention was paid to this important feature, for the landings were made in friendly territory and troops and equipment could be straightened out after landing without interference from an enemy.

The Stores and Supplies Required.—So far as possible the stores and supplies which will be required by the troops for at least the first week on shore, should be carried in the same transports as the troops; further stores and supplies should be carried in storeships which would accompany the expedition. While it is not so essential that these vessels be loaded with quite the same care as those transports from which the troops are to disembark, it is essential that they be so loaded as to make stores and supplies of all kinds readily available as required. An estimate of such stores and supplies must be determined upon in sufficient time to insure the arrival of such stores and supplies at the designated loading ports in ample time.

The Rate of Reinforcement and Replacement.—Not the least part of preparation for an oversea expedition is the provision for meeting the waste of war and for taking advantage of initial success.

The loss of men, animals and equipment in operations requiring landing against opposition will be severe and definite plans to make good these losses should form a part of the original plan. In the initial operations of landing the number of troops which can be used is limited but after landing has been accomplished success requires that the enemy be pursued or that an advance be made upon a definite objective, or at least that the enemy be driven back sufficiently to permit the establishment of the supply depots on shore.

Such operations entail the lengthening of the front with the consequent demand for additional troops. Reinforcement in excess of replacement is therefore an essential in many operations, and where conditions require, it should be provided for in the original plan.

(3) *Preparation of Navy Forces.—Due to the more advanced state of mobilization in which navies are maintained the purely naval element of a joint expedition can as a rule be assembled*

without the necessity for placing additional combatant ships in commission. In the event, however, of opposition by a naval force of a major power, it would be necessary for the Navy to place in commission many additional vessels.

In view of the possibility of enemy naval interference it is essential to consider the types of vessels required in the naval force which either as escort or as a separate operating force insures the safety of the convoy. Under any circumstances it is essential that the Navy provide escort for the convoy and such additional naval aid as may be required in effecting the landing.

In planning for the naval force required and its organization the considerations are very similar to those for the Army:

(1) The command.
(2) The total naval strength and assignment of various types of ships.
(3) The transports to be provided for the Army.
(4) The stores and supplies required for naval and army use.
(5) The special equipment required for assistance to the Army.
(6) The rate of reinforcement and replacement of the naval force and rate of supply of fuel and stores.

The Command.—The peace organization of the Navy includes a commander-in-chief, U. S. Fleet, and in any major campaign this officer would, in person, command the naval forces engaged in the expedition. The naval organization also provides a subordinate commander, the commander control force, who is charged specifically with the conduct of joint operations in so far as the transportation, escort, and naval assistance to army forces is concerned. A third officer, the director of Naval Transportation Service, is responsible for the provision of the transports and for their operations up to the time when loading is completed.

The Naval Force.—The naval force to be provided for the expedition naturally is dependent upon the strength of the naval force of the enemy which may be encountered. As has been pointed out previously large bodies of troops should not be moved overseas unless the cooperating naval force is strong enough to insure command of the sea in the vicinity of the transports and landing point.

This command may be obtained by the naval force destroying or containing the enemy naval force, or by its proceeding in

company with the convoy. The first method is the best, but is not always possible, due to the urgency for moving the troops. Had the British Expeditionary Force not been moved to France with the greatest celerity, it is quite probable that the first German advance would have reached Paris. The strategic situation must determine the urgency for the troop movement. If this urgency is great and the naval force available is materially stronger than the enemy naval force, the movement of the convoy under strong escort may be the only practical method. Under any circumstances the convoy should be escorted by suitable naval force.

In any operation against a nation having a large navy, our Navy will be required to place in commission many vessels which, due to lack of personnel and appropriations, are now out of commission. If the expedition is to be prepared without serious loss of valuable time, the vessels to be commissioned must be selected and given a definite order of priority.

Plans must be perfected for the expansion of personnel to meet the needs of additional ships, and the stores and supplies must be determined and plans made for their procurement and shipment. In all operations of war, time is a vital element. Efficient planning is the best and cheapest way of saving time.

In the selection of vessels to be commissioned careful consideration must be given to the duties such vessels are to perform and their suitability for the tasks. It is not enough that there be ships—the ships must be of the most suitable types and manned by personnel having a reasonable degree of efficiency in the performance of their duties.

While the provision of transports is an essential part of the naval preparation for a joint expedition, the plan of campaign may require a naval movement in advance of the army movement and in this case priority in equipment and loading of auxiliaries for the fleet may take precedence over transports.

In peace time the Navy maintains certain auxiliary types of vessels, such as destroyer and submarine tenders, repair ships, tankers, colliers and supply ships, in commission, but these are entirely inadequate in number to care for the needs of the fleet in an oversea campaign. The Navy must therefore obtain from the Merchant Marine many auxiliaries which are equally as important as the transports, and the plan for obtaining these and fitting them out is one of the most important parts of the Navy plan.

After the vital needs of the fleet are met, the transports are provided and fitted out. The Army Transportation Service and the Naval Transportation Service each have a few transports most of which are small. In order to obtain sufficient transports for any large movement, transports must be obtained from the Merchant Marine. The type of ships selected for transports is nearly always short of what we desire. Large size is advantageous in that it reduces the number of vessels and is more economical from the point of view of cost, personnel, and fuel. On the other hand large transports may be unsuitable due to their draft, and the difficulty of landing a large number of troops from one ship with rapidity.

In the World War large size was particularly advantageous as the troops were landed in friendly ports and often alongside piers. The large size gave increased speed, and greater comfort to the troops. There may often be times when great size would be a disadvantage, such as operations in the vicinity of ports having shoal water, or where the attack is to be conducted at several different points. The smaller size of transports permits greater flexibility in the distribution of force, and in case of loss does not entail so much damage.

Large expeditions, however, make such a demand on our Merchant Marine that suitability is measured usually by availability. If we are to be sure to have the required transports properly fitted out the vessels must be selected in advance and conversion plans prepared. Efficient planning is essential if the most valuable element of time is not to be wasted.

After the naval auxiliaries and transports are determined upon, it is necessary again to call upon the Merchant Marine for fuel ships, and storeships. These are not so hard to obtain, but plans must be made to insure that those most suitable are obtained and fitted out in a satisfactory manner. Plans for storeships must include those to transport army stores and supplies not carried in the transports with the troops.

Special Equipment for Assistance to Army.—The special equipment required for assistance to the Army is at present the most intangible of our requirements. This includes boats in excess of normal allowance, lighters, barges and various means of landing the heavy army equipment such as artillery, motor transport, etc.

No amount of paper work planning can insure efficiency in providing for landing operations. Practical experience must be

obtained in joint exercises and time and money devoted to experiments along this line. There is an old saying—"For want of a horseshoe nail, a kingdom was lost." This saying may easily be imagined to apply to the situation of landing a large body of troops without practical experience. We may not need a horseshoe nail but there may be some insignificant development which practical experience may demonstrate, which no amount of planning would develop. Some of the devices that have been used in the past will be considered in the later article dealing with the disembarkation.

Reinforcement and Replacement.—Last but not the least part of the naval plan is the provision of the required reinforcements and the maintenance of supplies and fuel. The nature of the reinforcement required naturally depends upon the strength of the enemy naval force. This reinforcement is of two types, that from vessels out of commission and that from new construction. While new construction cannot ordinarily be considered as part of a plan for a joint operation it cannot be entirely omitted because of its effect on the ability of the shipyards to outfit the vessels required for the expedition.

Although the amount of personnel replacement, and the necessary replacement of equipment and stores may remain constant no matter in what part of the world the expedition may be landed, the distance from home ports has a vital bearing on the number of merchant ships required to move this personnel and equipment across the sea at the required rate.

Unless the fleet and expeditionary force establish a satisfactory base, vessels will be unable to unload their cargoes and might be detained for weeks or months awaiting a demand for their stores or other supplies. Such delay will seriously increase the demands upon our Merchant Marine.

No claim is made that this discussion as to preparations for the conduct of a joint expedition is complete, but it is believed that enough has been said to indicate the necessity for proceeding with many of the plans which form an essential part of such preparation and the necessity for study of such preparations as a means to increased efficiency.

In the next article the subjects of the embarkation and the voyage will be discussed.

A DESTROYER IN THE NEAR EAST

By Lieut. Comdr. Richard Stockton Field, U. S. Navy

The U.S.S. *Goff*, Destroyer 247, was one of the twelve ships of squadron fourteen that were despatched to the Near East in the emergency following the expulsion of the Greek Army from Asia Minor in the fall of 1922. In a previous article the writer has described the quick get-away of the squadron from the United States, the arrival in the Levant, a tour of the Black Sea and return to Constantinople at Christmas time.

THE holidays passed quickly and on January 2, 1923, we found ourselves underway for a trip to the south. At that time, while he had twenty destroyers in his force, Admiral Bristol kept three in the Black Sea, one at Athens, one at Smyrna and two at points to the southward on the coast of Asia Minor or Syria.

We were pleased to learn that during our present trip we were to have a week at Alexandria, Egypt, as a sort of resting and sight-seeing period. We arrived at Smyrna early on the morning of January 3 and proceeded immediately for Alexandria, arriving late the following afternoon, having touched on three continents in three days.

Approaching Alexandria in the daytime the port is hard to make out. Ras-el-Tin lighthouse is a tall tower but there are other conspicuous things east and west of it, and we were not sure of our exact position until close enough to make out the town itself. The harbor is easily approachable through two dredged channels well marked with buoys and beacons. The port is artificial but ample for the enormous shipping which goes in and out. We moored bow and stern to buoys in the inner port. The *Fox* was in the berth next to ours and Lieutenant Commander Wellbrock, who was anxious to get out the same day, came aboard with all the information needed about the peculiarities of the port. After a few minutes the *Fox* cleared out for the Syrian coast. There was a boarding visit from the Khedivial yacht, *Mahroosa*, and as soon as we got straightened out I called on her captain, Streatfield

Bey, a retired British naval officer, then in the employment of the Egyptian Government. He wore the uniform of the Egyptian navy and a fez, or *tarboush,* as the red hat is called in Egypt. The Englishmen who hold official positions in Egypt are quite keen on being addressed by their titles of Bey or Pasha as the case may be. I was prepared for such names as Hussein Pasha and Kemal Pasha but I was surprised on visiting the director of ports and lights to find a perfectly good Irishman wearing the title of Grogan Pasha.

Our chief pleasure here was the realization that we were snugly moored in a real port. For the first time since arriving in the Near East we found ourselves in a protected harbor where the coming of bad weather need not interfere with all arranged plans. We went ashore and found Alexandria to be a modern appearing city laid out in squares with pleasing architecture and beautiful shops. There was a distinct difference between this and Turkey. Most of the native women were veiled from the eyes down. The common women wear black veils of a sheer material supported in the center by a brass or gold cylinder a half inch in diameter which, lying flat and vertical on the forehead, seems to deepen and mystify the large black eyes beneath. The better dressed wear thin, white silk veils which adorn, rather than hide, the face. The men of the merchant class wear over their trousers a long skirt, or mother hubbard, in addition to a regular coat and vest.

The youngsters in our crew had come to take complacently the extraordinary variety of costumes that we had encountered since leaving home. A seaman was heard to refer in amusing terms to a local contractor who was waiting on deck to attend to some business: "Tell the commissary steward there's a guy with a dress on waiting to see him." On another occasion a dashing governor accompanied by his highly decorated suite visited one of our ships. His *kavass,* a brilliantly uniformed footman, who remained on deck while the officials went below, was tired and leaned on a windsail which gave way to his weight. The quartermaster, whose job was to see and report everything, calmly called to his assistant, "Messenger! Report to the officer-of-the-deck that one of them kings just fell down the hatch."

The trip to Alexandria had attached to it the duty of getting contact with the diplomatic and consular officers at Cairo and

Alexandria. The visits of American men-of-war in foreign ports are, except in special cases, a great help to our consuls. Even in a country where the government is firm and well disposed toward our own the occasional visit of a warship tends to strengthen the consul's prestige with his colleagues and with the business men whom he meets in his daily affairs. The little ceremony that attends the formal exchange of visits between the naval commander and the consul, the boat with the consular flag, the side boys, etc., serve to demonstrate in part to the local public the respect which our government extends to its foreign service. It is not wished to stress unduly the benefits which the Navy extends to consuls. The destroyers must have proved a mixed blessing, indeed, to those gentlemen who had to guide and entertain us, shop for us, interpret for us and pay our public bills. The American consuls and their wives have been uniformly cordial and hospitable and they have no better friends nor greater admirers than the officers and men of the Navy.

Our next move was to Jaffa, a short motor ride from Jerusalem and Bethlehem. We had a brief visit to those Holy places but my principal reason for never forgetting Jaffa is the storm which came up while we were there. A small party had gone to Jerusalem and the bad weather prevented any communication with the shore for forty-eight hours. After stretching our anchor chain till its length was increased ten per cent we had to get underway and steam back and forth off the coast for thirty-six hours till we could send for our party.

The two days lost at Jaffa cut our stay at Beirut down to a few hours. Beirut was the headquarters of the French occupation of Syria. With a half dozen of their naval ships in the port and a considerable number of troops in the town the place had the air of being a part of France. We had a Consulate General at Beirut but the shortness of our stay prevented my getting acquainted with the personnel in charge there. We picked up a passenger at Beirut, an American business man who lived at Mersine and wished to return there. He could not have got commercial transportation for a week over the 200 miles involved, while with us it was only an overnight run. Whenever we carried passengers the admiral required a report of the circumstances, including a statement of the amount charged by the officers' mess for meals. Remembering

the strong wind and high following sea on the trip to Mersine, I was amused to see in the report, " . . . Charge for subsistence, None. (Passenger did not eat) . . . "

The *Fox* was at Mersine and moved on to the westward when we relieved her. There was never any inclination to remain in this port beyond the allotted time. At Mersine there were two American agents of the Standard Oil Company, and a group of American missionaries engaged ordinarily in school and church work among the Christians. At the time we first went there the leader of the missionaries, the Reverend R. E. Wilson, was caring for about 2,000 refugees, who were awaiting a ship for Greece. Mr. Wilson spent much time supervising the baking and distribution of bread for the refugees. He had to watch the bakers closely to prevent them from submitting their own dirty sweepings for the good flour furnished by the Americans. Among the refugees themselves it was difficult to get honest cooperation in the distribution of the bread. Many of the so-called Christians, selected to deliver the portions to their brothers in religion and, perhaps, in blood, would cheat the system by short-rationing their friends and selling the surplus. Mr. Wilson, a good, devoted, American preacher, gave up his life in this work, dying of typhus a few weeks after we saw him. I wonder if all the unfortunates, to whom he so kindly ministered, with all their merits combined, would be worth that one life expended in their service. And his was not the only one.

Bruce Wilson, his twelve-year old son, was the only English speaking boy in the town and I admired him for the way he maintained his nationalism. His habitual costume included an American army hat and the block letters "U. S." as worn on the army uniform. He spent a day and a night on the ship with us and added a sailor hat to his wardrobe. He could speak the Syrian tongue fluently but spoke English as an American boy at home would speak it. It must have been a great comfort for this real boy to feel the support that the Navy gave to his lonely but faithful persistence in carrying the emblem, "U. S.," in this out-of-the-way corner of the world.

Mersine, another of Turkey's ports open to the sea, lies at the head of an indentation too obtuse, or wide open, to be called a harbor. The city is small but is the principal port of Cilicia and

has a railway with daily trains to Adana. The Lloyd-Triestino and Paquet steamers stop there regularly, as do several Levantine English steamships. Always four or five ships were discharging or loading at the anchorage, and the business seemed as great as that of Samsun and Trebizond combined.

The following despatch, sent from Mersine in January, 1923, is an example of similar messages that the Navy was continually handling:

To Station Ship Smyrna. 1023 Refugee situation at Mersine as follows fifteen hundred without funds being fed by missionary with Near East funds period Of this number fifty are ill twenty-five of whom are seriously ill period No communicable diseases period Five hundred with funds who are supporting themselves period Total two thousand period All have permission to leave period Missionary has two thousand lire of Near East funds of which he spends about ninety daily period Request you give me as definite information as possible about eventual evacuation of these people 1220 *Goff*

Two days later we got the following answer from the American destroyer at Smyrna, which was in touch with the American relief organizations and with the Greek authorities striving to evacuate the Christian refugees from Turkey:

Goff 1026 Greek authorities state they expect to work further policy concerning evacuation by Friday twenty six January No information yet stop When relieved proceed Smyrna stop About one February you will proceed Constantinople via Mitylene and Salonica with Colonel Haskell on board 1230 *Edsall*

The *Litchfield* arrived on January 26 and the *Goff* sailed for Smyrna, a two days' trip at economical speed. About 300 miles west of Mersine we passed through the straits between the ancient city of Rhodes and the mainland of Asia Minor; then up through the islands, leaving Piscopi, Kandelusa and Levitha to port and Nikaria to starboard; and then through Khios Strait into the Gulf of Smyrna. At that time the Turks were in constant readiness for hostilities, no ships being permitted to approach their ports during the night. The approaches to Smyrna were announced to be mined and all ships wishing to enter the port must arrive at the entrance to the safety route by eight A. M., and follow in behind a pilot ship which was under the direction of the captain of the port. Smyrna harbor lends itself readily to mine protection. The city is in the southeast, or toe end, of a boot-shaped bay, of which the leg is

U. S. Navy Official Photo

AMERICAN BLUEJACKETS WITH REFUGEES AT SMYRNA

north and south and the foot is east and west. Just under the arch, five miles from the toe, the navigable channel narrows to 200 yards under the guns of a fort less than a mile to the southward. The pilot ship would lead us to this narrow part from three miles to the westward and then leave us. The remaining five miles to the city was clear of mines. The commercial port of Smyrna is behind an artificial breakwater and is large enough to permit merchant ships to enter and moor with stern to the seawall. Men-of-war anchored outside of and to the northeastward of the commercial port. At the time warships of the United States, Great Britain, France, Italy and the Netherlands were at Smyrna. Each of these nations had consulates in the city and these "Europeans," which included the Americans, made up a very pleasant little social colony. I never saw Smyrna before the fire, but from the looks of the ruins of the splendid buildings it must have been a very pleasant place in the old days. The heart of the city was then, four months after the disaster, in utter ruin. No steps had been taken to clear up the wreckage and one could hardly pick a pathway through the streets in the burned section.

On January 31, after two days at Smyrna, Colonel Haskell, an army officer, in charge of the Red Cross work in Greece and the American Relief Administration in Russia, came aboard and we set out for Constantinople by way of Salonica, Greece. The passenger-carrying facilities of a destroyer are limited. The ship's officers occupy all the staterooms and are protected by both regulation and precedent against giving up their quarters to passengers. There are two comfortable sofas in the wardroom and if there are more than two extras the excess must sleep on cots in the wardroom and passageways. Colonel Haskell occupied my cabin, but as there were six other passengers this trip was rather trying to our guests. To make matters worse just outside Smyrna harbor we ran into one of those nasty, sudden blows that spring up from any direction in the Ægean and have no regularity of duration. I slept on the bridge and did not have to visit the wardroom until arrival at Salonica at eight o'clock the next morning. We had gone through a very nasty night and those who had tried to sleep in the wardroom had sampled the miseries of the unsteady ocean in sliding cots and over-peopled air. We arrived with seven red-eyed passengers, every one of whom would have taken an oath that the *Goff* was the most uncomfortable ship afloat.

I went ashore with Colonel Haskell and visited one of the camps containing about 6,000 refugees recently evacuated from Asia Minor. There were 200,000 Greeks and Armenians in various camps around the city. The Red Cross man in charge told us that most of these people were sorry they had left Turkey and would swim back if they thought they could. Very few could speak any language but Turkish and those chosen as petty officials in the camp had to speak both Greek and Turkish to be useful. This was a well kept camp with clean buildings, sterilizers, and latrines where the basic laws of sanitation were well observed. A man in charge of each barracks was responsible for its cleanliness and he also drew the rations for his gang. Each day he must present a certificate from the inspecting officer that his barracks was clean before he could draw the food for his housemates. That system worked.

Our consul at Salonica thought these people would soon be absorbed by the country. "There are some of them who have been here in the status of refugees for two years," he told me, "but Greece has been at war and has not had time to think of them, but now that peace has been established the government will be able to look out for these refugees." His optimism was not shared by the Red Cross men nor has my subsequent experience borne it out. At Patras, six months later, American business men stated that the local Greeks called these Anatolian cousins "Damned Turks," and that the native laborers interfered with clubs when the newcomers attempted to engage in work. However this situation may adjust itself, the fact cannot be overlooked that the induction into Greece of several hundred thousand new citizens must have a serious economic effect.

We had a smooth trip from Salonica to Constantinople. The steward had stocked up with some fresh things at the Greek port and he and the cook seemed to try to make up to our passengers on this trip for the food that most of them had missed between Smyrna and Salonica. Very few travelers have been served fried chicken, candied sweet potatoes and apple pie in the Dardanelles, but the *Goff* had to do something to counteract the bad weather of the previous day. Thanks to our excellent cook, the passengers were well pleased and left the ship at Constantinople expressing a hope that they might "ride" with us again.

After a short stay in Constantinople we sailed about the middle of February for the Black Sea. Our orders were to go to Varna, Bulgaria, and take up the duties of "Radio Relay Ship" at that port. The Embassy and the Navy at Constantinople depended chiefly on radio for communication with Washington. Cable service was limited and expensive. The Navy had a contract with the owners of the big radio station at Vienna to allow U. S. Naval operators to handle American business. The Vienna station worked with Paris which, in turn, worked with the big navy stations in the United States. Ships at Constantinople had difficulty in sending to Vienna and, due to phenomena well known to radio men, sometimes called "radio shadow," there was great difficulty at Constantinople in getting signals through to ships on the south coast of the Black Sea. This problem was solved by having a ship at Varna, 150 miles north northwest from Constantinople. The relay ship could work Vienna with little difficulty and had no trouble at all communicating with ships anywhere in the Black Sea.

We were delayed two hours in approaching Varna by the heavy fog which is common in the Black Sea. This coast has not been accurately surveyed and there is a notation on the chart that one should not go within two miles of the indicated shore line. At Varna we relieved the *Fox*. The captain of the port gave us a convenient berth alongside the mole and for the first time since leaving home we were in a position to "walk ashore."

The following is from my diary written at the time:

Varna is the principal seaport of Bulgaria and even in these winter months has shown marked commercial activity. Every day there were five or six large ships loading and unloading. There are several hundred plows on the pier near the customhouse. They seem to be from Germany. There are thousands of Russians, both kinds, in the city. Varna seems to be a distributing point of Russian Soviet propaganda. The British steamer *Belgravian*, said to be chartered by the League of Nations, left here for Novorossisk with about 1,000 of Wrangel's men who have decided to go back to Russia.

I find here from the authorities and from the people the most generous welcome I have encountered on the station. The mayor, Mr. Angeloff, is a type worth describing. He is a Bulgarian of about fifty-five years. He has lived in England and speaks the language very well. Of the well known politician type, he is extremely courteous and very vain. The chief decoration in the mayor's office was an enormous portrait of himself. Mr. Angeloff

refers to himself, in English, as the "Lord Mayor." I noticed that now and then having used the plain word "Mayor,' he would immediately correct himself and say "Lord Mayor." He told us of a scheme of his to make Varna a second Monte Carlo. His idea is to interest foreign capital and to give to some organization a concession to build street railways in Varna and a large casino and hotel in the gardens near the city and to allow the organizers to operate these utilities and a gambling hall for fifteen or twenty years at the end of which time the whole accrued estate would revert to the city of Varna.

His proposition was interesting; his picture was vivid and fascinating. One could hear the click of the ivory ball, the *Rien ne va plus* of the croupier, and through the windows, the pistol shots of the suicides. Not being in a position to aid the "Lord Mayor," I could only express the polite hope that his dreams might come true.

Washington's birthday came while we were at Varna. The officials had been informed of the holiday and of our method of celebrating it. It was pleasing to see the Bulgarian patrol boats and a little English salvage ship follow our motions in full-dressing ship on the holiday morning. During the forenoon the "Lord Mayor" and other officials very kindly called and wished us well on our "Feast Day," as they called it. "Washington, oh yes, we all know Washington. He was the father of your wonderful country," said one. "We are proud to salute the great American nation on the birthday of the illustrious George Washington," said another. One high hatted politician, however, who must have been a sort of local dumb-bell, fumbled the ball when his turn came; "So this is the feast of Washington, what a beautiful city it must be!"

In the meantime the crew was holding a field day of sports on the pier a few hundred yards from the ship. Their games were new to the Varna waterfront and the word had apparently gotten about town that the American sailors were behaving in a most extraordinary fashion. Several hundred perplexed Bulgarians gazed in astonishment at the "mad Americans," who fought in pairs astride a greasy pole, who rushed strangely back and forth with potatoes in spoons, ran races with their legs in flour sacks and ate pie and whistled with their hands tied behind them.

From Varna we went to Constanza, Roumania, which will be discussed later, and then repeated our previous round of Trebizond, Samsun and back to Constantinople.

In March, 1923, we went into the Armstrong-Vickers dry dock at Constantinople to clean and paint the ship's bottom preparatory to holding a full power steaming trial. To reach this dock one must go up the Golden Horn through two bridges and after the second bridge make a 150° turn to the right in a space of about two ship lengths. The lower Bosphorus, where the Golden Horn joins it, is as thick with ships as Fifth Avenue and Forty-second Street is with motor cars. Some are at anchor, others are approaching and leaving their anchorages. The little *shirkets,* or ferry steamers, are continually going back and forth at fifteen knots. There is one particular bane of the Bosphorus, the low

U. S. Navy Official Photo

THE GOLDEN HORN

powered tugs with fifteen or twenty miscellaneous barges and sailing craft in tow, trailing out at all angles, and these always seem to be under the bow when one is ready to turn. The first bridge is open for only one hour and everything that needs to go through during the day must be on its side ready to rush through during this time. The opening through the lower bridge is not more than twenty feet wider than the beam of our destroyers. There are three different currents within the approach to this opening and, in addition to our other troubles, just as we were pointed fair to go through, a heavy fog set in. The pilot was a great comfort, but a pilot is only an adviser and his presence does not lessen the captain's responsibility. We eased through the bridge without

touching, only to find an impatient schooner, which could not wait her turn, bearing down from one side in such a way as to menace our stern, her bowsprit missing our flagpole by a few inches. In the thick fog we heard violent whistling ahead and a passing *caiquejee* informed the pilot that a large steamer above the second bridge had lost control and had been swept down across the opening of the bridge by the current. Here we were between two bridges, in a narrow, moving stream, in a thick fog with hundreds of schooners and boats around us. We kept just enough speed to counteract the current and give steerageway. We could neither go ahead nor astern. I felt like the enterprising water tender who once said, "I never stand up, I never sit down; I keep going all the time." After an hour the steamer got clear and we advanced another notch. The remainder of the task was comparatively simple and after another half hour we crossed the sill of the dry dock and the fog lifted. The Turks scrubbed the side with brooms made of bundles of firewood and worked all night putting on two coats of paint so that the ship was ready to go out when the bridge was opened the next morning.

The discipline of the crew ran along about the same as at home. With a crew of a hundred odd excellent men we might go several weeks at a time with no delinquencies or, when at Constantinople after pay day, we might have in one day six or eight men on report. Perfecto, mess attendant, third class, came up to the mast one time for having returned to the ship fourteen hours overleave. Upon being questioned he stated that he had gotten married the day before to a Greek girl at Constantinople and her family had prevailed against his will to make him take the night off from his duties. He also stated that his wife spoke only Greek and that what talking he did was confined to a few words of Greek learned during his courtship.

Constantinople was overcrowded with people of various nationalities who were eager to improve their lot by getting away from there. Anywhere to the westward they would be better off. America was heaven in their imagination. If a family could marry a member to an American bluejacket a strong lever would be thereby produced. A foothold would be gained in the land of promise and the sailor's wife, once established as an American citizen, would be in a position to help her relatives get to the

United States. The American bluejackets were by no means easy marks and many of them made good matches with worthy women who had no ulterior motives. But the fact remains that marriage with our sailors was the aim of many women whose real object was thus to obtain a visa and transportation to the United States. Perfecto had gotten himself into a peck of trouble. He, a Filipino, was not an American citizen and, even if he had been, under the United States laws a foreign woman does not automatically become an American citizen when she marries an American. She must come in under the quota allowed to the country of her birth although she is given precedence over ordinary immigrants. Perfecto was not punished for being overleave, and unfortunately my wish to punish his family-in-law could not be gratified. While naval discipline includes no jurisdiction over the right of an enlisted man to marry, it was Admiral Bristol's policy to place all reasonable obstacles in the way of sudden and ill-advised marriages between our men and foreign women. There are many bluejackets today who are thankful to the admiral that his wisdom has kept them from a life of incompatible marriage or worse.

The full power trials finished, we were ordered to Athens for ten days to afford radio communication to the legation, the relief organizations and business men there. Just as we were leaving Constantinople a dispatch was received directing us to go to Mudania on the south coast of the Marmora, pick up Colonel Haskell and take him to Athens, stopping at Cavalla enroute.

We moored in the inner harbor of Piraeus, the port of Athens. The American business men of the city took turns at furnishing a motor car to carry radio messages, which the destroyer handled on the regular commercial basis, to and from the city eight miles away. I took the first opportunity to do a little sight-seeing in Athens and to call on the Chargé d'Affaires and the Consul General. Mr. Caffery, our diplomatic representative, lived in the legation on University Street and both he and his successor, Ray Atherton, were very hospitable, and all in our mess were made to feel peculiarly at home in the legation. At that time our government did not recognize the Greek Government but maintained a diplomatic secretary in charge of American interests.

The Greeks were cordial and professed to admire us as a nation, and relations, though unofficial, were not difficult.

In the interests of one of the relief organizations we made a quick trip through the Corinth Canal to the Island of Cephalonia. The *Goff* was the first American war ship to visit Argostoli, the port of that island. There is a land locked bay capable of sheltering a modern fleet. Vine clad mountains surround the large bay and the unusually clean and pretty town of Argostoli sits in a little indentation on the eastern side just wide enough to afford an ideal anchorage for a destroyer. After the many exposed anchorages in that part of the world there was a wonderful feeling of comfort in this little haven. On the run back to Athens we stopped over night at Patras, the second sea port in importance of Greece. The American Consul there told us of a hard fight he had recently won to improve the methods of handling currants in their selection and packing. This fruit is a small grape and its treatment is in general the same as that of raisins. The best currants come from Patras and Corinth and from the latter city the famous little grape got its name. It had been the custom for years to lay the currants out on the ground in whatever filth might be present, there to be picked over and assorted by dirty workers accompanied by swarms of flies. This unsanitary handling had roused the official ire of our consul and he, representing the nation which was the greatest purchaser, had after long effort been able to bring about an embargo which forced the local packers to provide proper floors in screened warehouses and sanitary handling by those engaged in assorting and packing.

The *Goff* relieved another destroyer at Smyrna on April 17. A few days before this, two Greek prisoners of war, who had escaped from their Turkish captors and thrown themselves into the harbor, had ultimately arrived in an exhausted and drowning condition alongside the American destroyer. If these men had been in a boat they would not have been allowed to come aboard, but in the darkness of night when they were frantically calling for help, to rescue them from the water was the most natural thing in the world. Once aboard, however, and revived, they made known their status to the captain, who realized that he had a situation on his hands.

In boarding an American warship these prisoners of war

had gained neutral ground and, according to international law and usage, were immune from return to their captors. After the matter had been threshed out it developed that the American Navy must hold them interned until they could be exchanged and sent back to Greece. The Turkish military authorities in the meantime, although realizing what the international practice must be in such a case, were very anxious to get back these prisoners and, while not making any formal demands in the premises, had attempted to persuade the destroyer captain to turn them back. That officer informed the Turkish general of the peculiar status of the escaped prisoners and retained them. When I relieved him a few days later he turned over the prisoners to us.

The following is quoted from my diary of April 18, 1923.

Called on the Vali, on the general commanding the fortifications and on Izzadeen Pasha who is the general commanding the troops. He is the general interested in the prisoners. When I went with the interpreter from the consulate to call on the general, his aide, after we had announced ourselves, came back and asked what was the purpose of the visit. The interpreter did not repeat this question to me until after we had completed our visit. He said that he had told the aide that I was making an ordinary call of courtesy on the general. Izzadeen Pasha received me with a cold and unpleasant look on his face and sat for an appreciable time without saying anything after I had shaken hands with him. I do not know if this is his natural manner or whether he is showing annoyance because we are harboring his escaped prisoners. I informed him that the two prisoners had been left on the *Goff*. The following conversation then took place:

General: "Why are these prisoners being kept on the American ship?"

I: "They are being kept under guard on an American ship until their ultimate disposition is decided by proper authority."

General: "Whom do you consider proper authority?"

I: "The American and Turkish authorities at Constantinople."

The subject was then changed. Izzadeen's manner continued cold. The other officials whom I visited were very courteous, indeed. I believe that Izzadeen's manner was his normal manner. His looks convinced me that whatever pleasures he gets from life are not hilarious.

The two Greeks were transferred to the *Edsall* when that ship relieved us as Station Ship at Smyrna. They needed no guards. They could not have been driven away from the American ship with rifles. After about six weeks of high life and big rations in the United States Navy they were finally sent to Greece and the question was regarded by all parties as settled satisfactorily.

It was a pleasure to vary the monotony of the Turkish ports with an occasional visit to Roumania. The natives of this country do not take their troubles too seriously. Their money has a very low relative value and is apparently not improving, but the people seem to be happy, well dressed and free from care. We visited Constanza several times in winter and summer and always found the shops wide open, plenty of commerce in the harbor, lots of amusement places and everybody working hard and playing hard. We arrived at Constanza in June with authority to spend four days visiting Roumanian ports. The *Goff* had been there twice before and we were on very good terms with the officials. Admiral Schodra, the naval commandant, was a fine looking old seaman with a tremendous beard, and was a graduate of the Italian Naval Academy at Leghorn. Nicolas Negulescu, the prefect, was very courteous to us. Three of the *Goff's* men got into an unfortunate scrape in the city and their conduct was entirely out of keeping with the traditional excellent behavior of our bluejackets. Anticipating a letter from the prefect on the subject a formal note in French deploring the bad behavior of these individuals was hurriedly sent him, assuring him that the men concerned would be punished, and inviting his attention to the model conduct of the great majority of our sailors. The prefect replied immediately in pleasing language, finishing his letter with the statement that "the admiration of the Roumanian people for the great United States is too great to be stirred by such trivial incidents." The day of our arrival at Constanza, Peter Augustus Jay, the American minister at Bucharest, was informed by telephone that the *Goff* was going to visit Sulina and then go up the Danube as far as Galatz. In the name of Admiral Bristol, an invitation was extended him to join us for the trip. Fortunately for us, Mr. Jay was able to accept and we set out early one morning with the intention of stopping for the night at Sulina, at the mouth of the Danube. It became stormy during the day and I decided not to try to cross the bar at Sulina with the sea that was running and anchored overnight at the Portici anchorage, south of the Saint George mouth of the Danube. We passed through the Sulina mouth early the next morning and entered the river. At Tulcea, about fifty miles from the sea, the Danube breaks into a trident and flows outward in three

courses. The main entrance is the Sulina branch which consists of a canal cut straight from the sea for thirty-four miles inland, by-passing, for that distance, the narrow and serpentine bed of the original river. There was a depth of only nineteen feet at the dredged entrance and ships drawing more had to anchor outside and tranship their river cargoes.

Sulina seems to exist chiefly as the home of the European Danube Commission which was brought into being incident to the Treaty of Paris of 1856. Its first organization consisted of a member each from Austria, Great Britain, Prussia, Sardinia, Russia and Turkey, and its mission was "to designate and cause to be executed the works necessary below Isaktcha to clear the mouths of the Danube as well as the neighboring parts of the sea, from the sands and other impediments which obstructed them, in order to put that part of the river and the said parts of the sea in the best possible state for navigation." It was intended that this commission should exist for two years, after which its functions should be handled by a commission of the countries contiguous to the river, but the body has been continually renewed and its powers extended up the river as far as Braila, and in 1878 a Roumanian delegate was added to the commission. The present commission has one member each from France, Great Britain, Italy and Roumania.

To the northward of the Danube, limited by the Pruth River on the west and by the Dniester on the northeast, is the much-talked-of Bessarabia, formerly of the Russian Empire but now a part of Roumania. To the southward, between the Danube and the Bulgarian border is the section known as Dobrogia. The canal from Sulina inland has from twenty-five to forty feet of water and, except for one section of three miles, is wide enough for two large ships to pass abreast. From the junction of the canal and the main river to Braila, a hundred miles from the sea, the channel is deep and wide.

The shameless exercise of poetic license by a writer of waltzes had filled the romantic heart of my boyhood with a desire to see this wonderful river which I pictured as a stream of clearest sapphire, gentle as a melody, flowing to the sea. My mind has been disabused. The waltz is lovely but the river is not blue. The sight might better have been the inspiration of "Waitin' for the

Robert E. Lee"! We anchored in the stream off the city of Galatz in the afternoon, ninety miles from the river's mouth. Roumanian officers informed us that the destroyer could have gone as far up as Giurgiu, just south of Bucharest and 100 miles further inland. We spent one day at Galatz. It was most active as a commercial port. Dozens of steamers were loading and unloading. Large barges were taking on cargoes of lumber for the steamers which had to wait outside at Sulina. There was a very respectable navy yard where gun boats and destroyers were being repaired.

Some officers of the Roumanian Navy and some foreigners gave their ideas about the European Danube Commission. Their remarks are summed up as given from two different points of view. The Roumanians said:

"When Bessarabia was part of Russia there was proper ground for having such a commission because the mouth of the river did not lie wholly in one country. Now, however, as Bessarabia is part of Roumania, there is no justification for the commission as the mouth of the river is entirely in Roumania and the control of the lower part of the river should be exercised entirely by Roumania. Before the commission took over the administration in 1856 there was always a depth of twenty-two feet at the Sulina entrance. Now, although the commission puts a heavy toll on all shipping, the overhead of the administration is so high that the receipts are not put into dredging and the money which should be used exclusively for river improvements goes largely to pay the salaries of the commissioners."

The foreigner gave another point of view:

"Bessarabia and Dobrogia are nominally Roumanian and belong to that country at the present time but neither tenure is certain. Bulgaria longs for Dobrogia and Russia threatens to take back Bessarabia. Roumania holds the latter section only by retaining in Bessarabia a large army. There are precedents for such a commission, for example that of the Rhine. Bulgaria, Jugoslavia and Hungary are adjacent to the navigable part of this river and their riverain rights must be guaranteed by international administration. The tax put on river shipping is necessary for the upkeep of the canal and the salaries of pilots. The Roumanian government could greatly reduce the individual cost of the toll by adopting a more liberal policy of export."

Before leaving Constanza leave was granted to a large party of the crew to visit Bucharest, with instructions that they should rejoin the ship at Galatz between certain hours. Mr. Jay remarked that he didn't see how these men could be turned loose on such a complicated trip in a totally strange country with any

assurance that they would successfully find their way to the designated place at the expiration of their leave. "How can they," he asked, "when they don't speak the language?"

"I don't know what they speak," I answered, "The American sailor abroad has a general sort of language that he calls 'parley voo' and I've never heard of one ashore failing to get what he wanted." The minister was present when the officer of the deck reported that all of the leave party had returned on time. He thought this was extraordinary, but of course none of the officers had expected anything else. There is no better advertisement of American merit than a clean, intelligent, snappy crew of American bluejackets. We don't appreciate the superiority of our sailors so much at home as we do when we see them abroad and have an opportunity to compare them with the bluejackets of other navies. An American woman who had been living for years in Bucharest wrote, "When I met in the streets of Bucharest those strong, beautiful boys in the uniform of the American Navy, when I looked into their happy, intelligent faces I wanted to shout to them that I, too, was American; and I had the first pangs of homesickness that I had known since I was a little girl."

From Roumania we went again to Odessa with orders to extend the usual facilities to the American Relief Administration and particularly to meet Senator Smith W. Brookhart, who was coming out of Russia, and to give him transportation to Constantinople on our return trip. We found Odessa the same as six months before except that there were more stores with plenty of shoes, clothing and manufactured articles, whereas at the time of our earlier visit there had been little but second-hand goods. Senator Brookhart arrived in the afternoon of June 18 and we sailed next morning for Constantinople. The senator had been ten days in Russia and had talked with Trotzky and Tchicherin at Moscow, who had given him every freedom in his travels. The senator, whose greatest interest was the welfare of the farmer, had been traveling in Europe studying the systems of cooperative banking employed in various countries. He had observed with a trained eye the wonderful wheat crops in Russia and a note of melancholy was detected in his voice as he referred to the neglected possibilities of corn-raising in that country.

Most of Mr. Brookhart's interests were not mine, but we were on common ground when he discussed rifle shooting and marksmanship. At the time of the Spanish-American War he had been a lieutenant of the Iowa National Guard. His company had been allowed some ridiculously low number, thirty or fifty, of rounds of ammunition per man with which to teach the recruits how to shoot their rifles. This neglect galled the young officer and, after the war when he was appointed captain of a national guard company, he secured a large quantity of ammunition and made sharpshooters of ninety-five per cent of his company. In teaching his men to shoot he had become an expert himself and he was soon recognized as one of the best shots in the United States. From membership of a national team to the captaincy of a team which won international matches and then to the presidency of the National Rifle Association were his natural successive steps and the senator said he never allowed anything to keep him from attending the national matches.

As the situation in the Near East began to calm down it was realized that we did not need so large a force as our government had kept there throughout the last of 1922 and the early part of 1923. The squadron of twelve destroyers, to which the *Goff* belonged, was sent out during the excitement that followed the expulsion of the Greek Army from Asia Minor and the destruction of Smyrna. At that time it was necessary to have a large number of ships on the station ready to take adequate care of American residents. What had happened to Smyrna was not likely to happen to other places but active hostilities between the Turks and some European power were conceivably possible during a period of several months and such an eventuality would have called for the active employment of all of Admiral Bristol's twenty-four ships in extending protection and refuge to American citizens throughout the troubled area. As it became apparent that the Lausanne Treaty would preclude open trouble it was decided to send the greater part of the destroyers home. Six of the squadron went home in June and another six, including the *Goff*, left in July, stopping at Naples and Gibraltar on the way. The *Goff* was at Mersine when ordered to return to America. I was temporarily assigned to the *Litchfield* with orders to command the *Parrott*. The *Litchfield* met the *Parrott* at Smyrna.

This ship made three more trips around the Black Sea, spent the month of September at gunnery exercises in the Sea of Marmora and in October went back to Athens to act as station ship.

At this time, the so-called Revolutionist party was in power, having gained control of the government in September, 1922, soon after the defeat of the Greek Army in Asia Minor. The revolutionary movement was conceived and carried out by certain army and navy officers under influence of the recent military disaster for the purpose of dealing with the ministers and officers who had been responsible for the army's catastrophe in Asia Minor. They had brought about the abdication of King Constantine and had remained in power pending elections which were due to occur in December, 1923.

In the latter part of October planes flew over Athens and dropped placards announcing that a counter revolution had taken place, and that the armies of Epirus, Macedonia and the Peloponnesus, and the navy were combined in the new movement, the object of which was to take over the control of affairs and guarantee uninfluenced voting at the coming elections. A certain general and several other high army officers had gone to Corinth, on the Peloponnesian peninsula, and had gathered the troops there about them and announced the counter revolution. We visited Patras the day after the counter revolution was declared. As soon as we anchored, a boat came out from the shore with Mr. Donegan, the American Consul, and several Greek officers. The latter stated that Patras and all the Peloponnesus were in the hands of the counter revolutionists, that all the army was with them and that after a few days their forces would march peaceably on Athens to take over the government. "There will be no bloodshed," they said. "We will fight if necessary but when the opposition sees our force they will retire gracefully and we shall take charge without combat." They asked for news from Athens and of the Greek Navy. We told them that we knew nothing except that the Athens papers stated in effect that the counter revolution was weak and sporadic and would die of its own weight in a few days; and that the Navy would remain loyal to the old government. They did not believe this; the Navy was moved by the same noble spirit and must be on their side.

Miss Owens, of the Near East Relief, arrived at Patras that

day on a military train from Corinth. She said that the Near East Relief orphanage at Corinth was in danger because the counter revolutionists had encamped all around it and, in case of attack, the orphanage would be right in the midst of the trouble. A wireless message was sent to the legation at Athens to acquaint our representative there with the situation at Corinth. He was assured by the government that the orphanage would not be harmed under any circumstances.

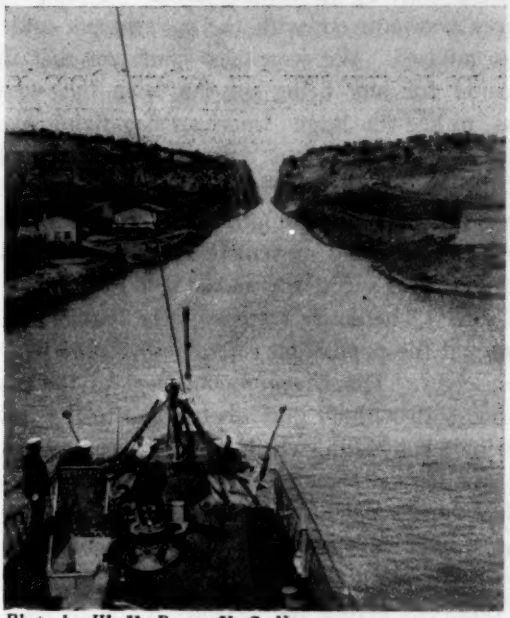


Photo by W. H. Perry, U. S. N.

APPROACHING THE CORINTH CANAL

The second day at Patras we got word by radio that a Greek battleship would arrive at Patras that afternoon. The people ashore had heard this but did not know whether the ship was on their side or the other. The success or failure of the counter revolution depended on the ship's action, because all realized that the navy controlled the Corinth Canal and that no movement of troops from the Peloponnesus to the mainland could be accomplished if the navy were against them. The people had been led to believe, however, that the navy was with them against the government.

At about three in the afternoon we sighted a battleship standing in from the westward and the familiar old cage masts, as they gradually rose over the horizon, revealed to us our good old *Idaho,* which, before her sale to the Greeks in 1914, had known glorious days in our Navy where for one year she had flown the battle efficiency pennant as the champion of the fleet. The *Lemnos,* as she was now called, was observed from the city and the water-front was packed with citizens ready to celebrate or take cover according to the action of the oncoming war ship. We knew that the navy was entirely with the government and the consul had been so advised. We were also confident that there would be no occasion for any firing on the town but were relieved, nevertheless, to see the large American flag flying over the consulate and another conspicuous ensign on the water front hotel where all the local Americans were gathered. As the *Lemnos* came nearer the citizens equipped with glasses began to make observations which caused movement in the crowd. By the time she was close enough for the naked eye to see her guns the crowd had gone. The entire battery of the battleship was trained on the town and the population recently so visible had thoroughly hidden themselves. The *Lemnos* continued to the eastward and fired one shot with a small gun when opposite the town to bring too a small merchant ship, which was required to tail in behind her. This was her only sound but the unsympathetic position of her guns had convinced the people of Patras that the navy was against the counter revolution. When we went ashore late that afternoon we did not find as many enemies of the government as we had observed before the passing of the *Lemnos.*

The *Parrott* made one more tour of inspection around the Greek islands. We made three stops on the island of Crete, visited Mitylene and Khios and spent a week-end at Vathi on the Island of Samos and then visited Mykonos, Delos, Syra, Tinos and Andres and returned to Athens. With the exception of Delos, all of these places were centers of refugees from Anatolia. We found that these people were being fairly well cared for. Some of them were becoming self-supporting and on the Island of Crete farmers from Samsun and Smyrna had begun to raise crops of tobacco with a fair prospect of making that an important industry on the island.

I left the *Parrott* at Mudros Bay, Greece, on November 20, 1923, and came home in the U. S. S. *Denebola.* My thirteen months' cruising in the Black Sea and Eastern Mediterranean had been as interesting as any peace time naval duty can be. I had seen the Navy covering a wide range of usefulness beneficial to the American people as a whole. Services, diplomatic and economic, commercial and philanthropic, services performed according to the spirit which was summed up by Admiral Bristol as the keynote of our mission: "Remember that all Americans look alike to us out here. Rich and poor, pleasant and unpleasant, they all look alike to us and our duty here is to protect their lives and to guard their legitimate interests."

JOHN ADOLPHUS DAHLGREN (1809-1870)

By Captain Ralph Earle, U. S. Navy

"THE gunner, that honest and godly man, learned in arithmetic and astronomy, was master of a terrible craft—his saltpeter gathered, it was said, from within vaults, tombs, and other desolate places; his touchwood made from old toadstools dried over a smoky fire; himself working unscathed only by grace of Santa Barbara, the protectress of all artillerymen."

This, the mystery attached to ordnance in the middle ages, persisted in large part well down into the nineteenth century, and most officers of the Navy, because this branch was seemingly occult, left it severely alone. Indeed, for three decades following the War of 1812, no real advance had taken place in either the United States or Europe. To rouse our service from this lethargy required an officer of genius and unusual force. Such an one Dahlgren proved to be.

His ordnance system was founded upon two principles which he formulated: (1) "Speed is an essential requisite for a first-class ship of war, but essential only to go into action, not out of it"; and (2) "the greatest strength will be found in the simplicity and concentration of guns of one caliber, if this caliber is the largest which it is practical for ships to carry." It was these principles that resulted eventually in the displacement of wooden vessels by ironclads. In the days when fleets fought according to the tactics of the eighteenth century, with guns that had changed very little almost up to the time of the Civil War, ships-of-the-line and frigates often pounded away for hours or days, gaining no decision and inflicting very little damage. When Dahlgren produced guns that were much heavier and more accurate, and substituted for solid shot shells that tore out the very vitals of the enemy wooden ship, it was plain that a better defense must be afforded, and armor was a logical development.

Dahlgren, born in Philadelphia, came of good old Norse stock. Both grandfather and father were graduates of Upsala University, Sweden, and their character and standing were quite the equal of their education. His father, adventurous by nature, at the age of twenty got into trouble because he assisted in the distribution of some republican literature—a heinous offense in the eyes of monarchy. In consequence he was obliged to flee and his property was confiscated by the Crown; but political offenses are often such as carry with them little or no blame. It was not long before he had won recognition in Philadelphia, where he made his new home, as a merchant of ability and signal integrity. Soon he was appointed Swedish consul there, a position which he held until his death. Nor was the future admiral less fortunate in his mother, Martha Rowan, of Philadelphia. She was descended from one of the earliest settlers of Pennsylvania, and her father had fought in the battles of Germantown and Princeton.

Dahlgren early conceived a longing for the sea. The sight of deeply laden ships to be seen from his father's doorstep, a glimpse of the navy yard, which he visited on a holiday ramble to gaze at the dreaded three-decker, *Pennsylvania,* and the reading of Cooper's sea tales, particularly *The Pilot,* decided the lad at the age of fifteen to apply for a midshipman's warrant—only to be promptly refused. His father had died the year before, leaving the family in straightened circumstances. As he was the eldest child, he had to depend on himself, but he showed no faltering in his pursuit of a career. He induced schoolmasters, a judge, a doctor, his representative in Congress, and other friends of standing to write to the Secretary of the Navy, and while this well organized campaign was in progress he gained a first-hand knowledge of the sea by shipping before the mast on the brig *Mary Becket,* bound for Trinidad de Cuba. Before his return the Secretary had signed his warrant as midshipman.

His first cruise, which was on the frigate *Macedonian,* began the same year (1826). The long voyage, though occurring in a period that presents a blank page in naval history, was not without excitement for the eager boy. He witnessed a fight off the east coast of South America between Brazilian and Argentine vessels, met with slave ships from Africa, and chased a buccaneer.

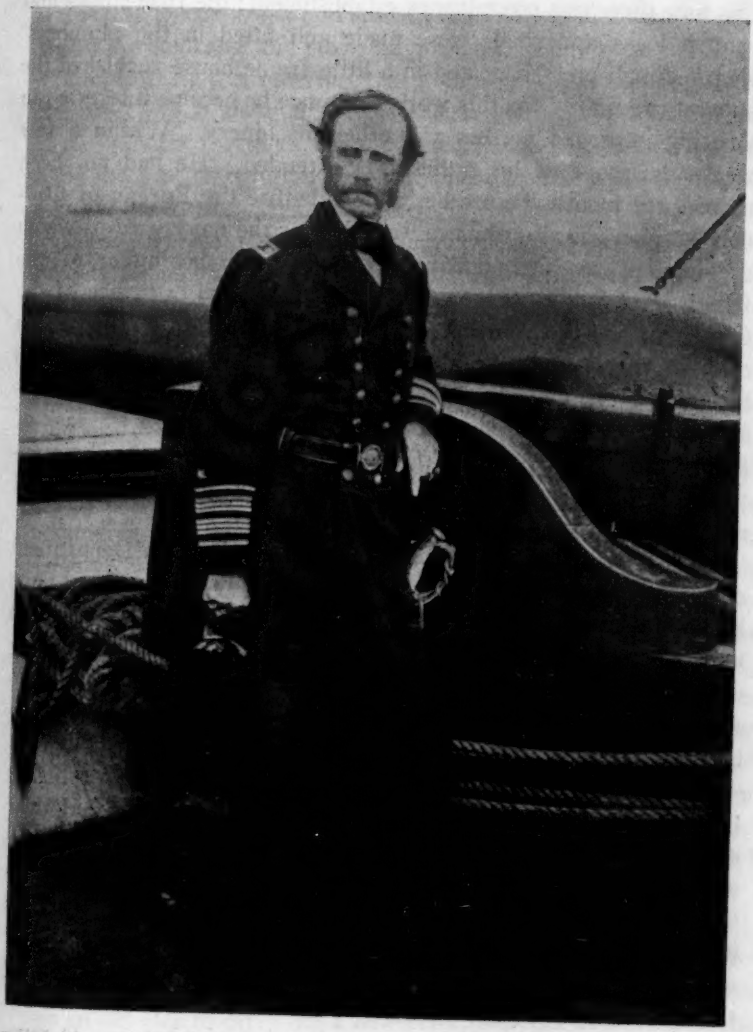
Duty valuable as preparation for his later work came to Dahl-

gren in the years 1834-37 in the Coast Survey. Because of close application, before its conclusion he was suffering acutely from eye strain, and the trouble was so serious that for five years it interrupted his active naval career, at one time threatening to terminate in blindness. Treatment in Paris under a renowned specialist brought no immediate relief; but courage building on a strong constitution, aided by thorough rest and falling in love with a noble woman whom he made his wife, in time repaired all damages.

The duty that followed should also be regarded as important in the period of preparation; he was ordered to the *Cumberland*, cruising for three years in the Mediterranean. Four Paixhans (shell guns) were assigned as his division, and it was then that his bent for ordnance first came to notice. There existed a strong prejudice against shells, a type of projectile new to both officers and men, but Dahlgren at once realized their great superiority. To overcome the distrust felt by the crews he laid the guns himself, and his analytical mind recognized the difficulties which must be overcome. After each discharge the crews on the gun deck, being enveloped in smoke, did not know how to give the right elevation to their pieces. Dahlgren at once originated a plan for point-blank fire, laying the dispart by the horizon. The motion of the ship made necessary some such means for correcting the level. The beauty of the scheme was its simplicity, for it was not beyond the comprehension of the ordinary sailor; yet this was the forerunner of the directorscope of World War days. Dahlgren was indefatigable in drilling his division, and results were not lacking. He writes: "The second (my own) did the best firing; their volley was like one crack. I always tell them that I must have them the best in the ship, and one would smile to see how they go ahead when I say, 'Come, Second Division, we must not be last.'"

A few months later an entry in his journal shows that he had made a beginning in what was later to prove an imposing array of inventions relating to ordnance: "I am much occupied with having made a model of a spring percussion lock, which is to overcome the insuperable difficulty that has hitherto prevented its use. The exploding powder escaping by the vent has always destroyed the lock hitherto."

It was in 1847, when Dahlgren was between thirty-seven and thirty-eight years of age, that his distinctive service began. In



A Fighting Inventor

Rear Admiral John A. Dahlgren, U. S. N., on deck of his flagship, *Pawnee*, on blockade off Charleston, S. C. Ruins of Fort Sumter in background

January he was ordered to the Washington Navy Yard and given the especial assignment of making Hale's rockets. He writes, "At this time there was no ordnance establishment; the fuze stocks and cannon locks and shells were made and fitted in the plumbers' shop." Small presses located in a little frame house furnished the apparatus required for this work. At once he became interested in devising improved presses and other machinery. Within a few weeks the scope of his duties was extended. He had not been there three months before he had put before the Bureau of Ordnance a plan for an ordnance workshop at the navy yard to which the bureau gave its approval. This was the beginning of the famous gun factory that was to supply the naval ordnance of the Civil War and the World War. A month later one of the bureau told him that there was the prospect of giving some permanency to his present assignment. The new thirty-two-pounder system was at this time being introduced, and to Dahlgren was set the task of fitting to the guns tangent sights which had just made their appearance. This was done by actual firing and plotting the fall of shot, using Coast Survey methods.

In October of this year the position of head of the Department of Gunnery at the new Naval School (Academy) was offered him; but his enthusiasm for the work lately begun, in which he saw such large possibilities, compelled him to decline. Later, at the urging of the Secretary of the Navy, he offered his assistance by going to Annapolis twice a week and instructing midshipmen—this in addition to his regular duty.

Realizing the need of guns suitable for ships' boats, Dahlgren two years later designed and built the boat howitzers and their carriages. The idea at first encountered great objection from the service, but these guns were the twelve- and twenty-four-pounders that were destined to prove so serviceable on the rivers and in cutting out and landing expeditions during the Civil War. They also were used in the tops of Farragut's squadron when running the batteries on the Mississippi.

Next, he gave himself to the construction of what was to revolutionize the armament of the ships of war and increase their effectiveness tremendously by introducing all big guns. In 1850, though still only a lieutenant, he submitted to the Chief of Ordnance plans for a 9-inch shell gun weighing 9,000 pounds, made

on strictly new lines. In the same month, he also designed a fifty-pounder of 8,000 pounds. These guns, which were experimental, were made at the West Point iron foundry, near Richmond. They were of iron, cast solid, and smooth bore. Their distinctive feature was their huge size and curve of pressure. They were the first to exhibit in their form the fact that greater strength was required at the breech than along the chase and at the muzzle, their unusual shape gaining for them the sobriquet, "soda bottles." They embody the first recognition that guns must be designed scientifically so as to stand the varying pressures in the bore.

There had been much professional criticism of the models, many officers taking the view that the guns would present an excessive weight and prove unmanageable, but weight is of no concern if proper means are applied for handling it; the guns on being tried gave most satisfactory tests. Of the two guns it was the larger, the 9-inch, that Dahlgren much preferred when it came to practical use.

Nor did he stop here in urging large ordnance. While the government still leaned to the idea of light steamers withdrawn from commerce as a valuable asset in time of war, he advocated screw frigates armed with 9-inch shell guns throughout on the gun deck and 10-inch pivot guns on the spar deck, but, as he remarked, "Public opinion is evidently not for shell guns solely, nor for heavy cannon." Many years were to elapse before he was to see ships armed as he advised. Nevertheless, he went ahead in his experimenting, and instead of compromising with those who wished little or no change, next constructed an 11-inch gun, and then a 15-inch; he made designs even for a 20-inch—this, however, was never fabricated. It did not in the least trouble him that the old sailing ships of the Navy were not planned to carry such guns. As he enthusiastically wrote to Lieutenant Matthew Fontaine Maury in December, 1850:

"The only 9-inch gun in the United States is that which has been cast after my proposition and draught. . . . I never would patch up an old idea to carry out a new principle. Let us have new ships for heavy ordnance and steam, and the old frigates will make excellent coal ships. A merry Christmas to you and yours, and I hope another year will enable us to say to the new Navy—'A merry Christmas.'"

There was too much inertia in the Navy, and too great indifference on the part of Congress and the nation to witness more than the beginning of the suggested change in a twelve month, but Farragut, Foote, Rowan and Drayton, master minds of the Navy, all encouraged Dahlgren to the utmost.

His life in these years was full indeed, for in addition to an enormous mass of routine work there were constant interviews with the Department and with committees of Congress. On May 15, 1854, "the cradle of ordnance," as Dahlgren had termed the old building assigned to ordnance at the yard, was superseded by a structure erected for the purpose and fitted with appropriate machinery. The ordnance plant in 1856 comprised a gun foundry, machine shops, carriage and mount shops, besides facilities for the fabrication of all types of accessories and spare parts, and an experimental battery.

In 1855, when the superiority of his guns was beginning to be known, not only throughout our own service but also abroad, he was promoted from lieutenant to commander. He was now forty-six years of age, and a large family then, as now, presented to an officer in the service problems in addition to those more directly related to his profession.

Dahlgren early had realized the great economy that could be effected by arming a few strong frigates built to carry the heavy guns he had designed. By a convincing analysis he showed that their broadside would each be only 154 pounds less than that of the largest three-decker afloat, and he urged what has been recognized since, the great increase in offensive power that comes from concentration, such as could be afforded only by ordnance of large caliber.

When Congress finally authorized six frigates, he labored with great persistence that at least one might be fully armed according to his plans. On winning the assent of the Secretary and submitting designs for the *Niagara,* the complete realization of his plans was frustrated by the opposition of Mr. Steers, the constructor; the latter objected to an armament of all big guns for fear it would injure the vessel's speed. As a result her armament represented a compromise, Dahlgren's plans being accepted for the gun deck, and Steers' plans for the spar deck.

The *Merrimac,* commissioned in 1856, was the first vessel

equipped with 9-inch Dahlgrens. The gun trials were thoroughly successful; the large pieces were not unmanageable, and proved to have greater range and accuracy than what had been previously used. Further, as experimental tests had shown, the curve of pressure greatly increased the life of the guns. Whereas the best of the earlier heavy guns, the "Columbiads," had rarely exceeded 800 rounds, the Dahlgrens lasted seldom less than 1,800 rounds, and in several instances exceeded 4,000. The tests were convincing.

In this same year Dahlgren published a work on *Shells and Shell Guns,* which attracted wide attention abroad as well as at home. The London *Morning Post* wrote: "To no one—not even to Paixhans himself, it may be—is the naval shell system more indebted than to the author whose able and interesting work now lies before us. Paixhans, indeed, had the intelligence to perceive the application of shells fired from long guns, and employed in naval warfare, but Dahlgren was the first to carry it out as an exclusive system of naval armament. . . . This great revolution of naval armament is chiefly attributable to the authority of Commander Dahlgren."

To his great satisfaction he was now informed that he would command the *Plymouth,* which he might arm as he wished and use to test his ordnance projects. In due time she was fitted out at the Washington Navy Yard with one 11-inch and four 9-inch Dahlgrens, besides three howitzers. In addition, Dahlgren added one hundred rifled muskets, an arm of his own invention, the first rifled shoulder pieces in our country.

When the *Plymouth* had put to sea, practice with the 9-inch and 11-inch guns began and continued day after day. The efforts used to make the gunnery seem like a game and to arouse emulation resembled those of recent days; there was rivalry between the different crews and premiums were given to the three individuals most skillful in the general handling of the guns and to the three best shots.

In a cruise of six months, June to December, 1857, Dahlgren visited the Azores, Lisbon, the Texel, and Southampton. Encountering heavy weather he found opportunity to demonstrate that the large guns could be fired in spite of unfavorable conditions. Some 121 shells were discharged without great difficulty from the 11-inch pivot gun.

From May until December, 1858, Dahlgren cruised along the Mexican Coast in the interests of American citizens, mainly at Tampico and Vera Cruz. He showed himself a master of international law and found occasion to urge many things upon the Mexican Government. Our consul at Tampico wrote: "You have done more for the commerce of this place than all the ships and squadrons belonging to the United States have done since I have had charge of this consulate."

In 1859 Dahlgren resumed work at the Washington Navy Yard on rifled ordnance, the ten and one half pounders being the first guns finished. Abroad, the Armstrong rifled gun was now coming into use. Except for an unsympathetic chief of ordnance, Dahlgren would, previous to the Civil War, have developed and manufactured rifled ordnance capable of piercing any armor. When the war came it interrupted all progress in this direction.

As near as the mistakes in her construction permitted, the *Niagara* was now armed with the battery Dahlgren had desired. She was one of six steam frigates built for the Navy, the others being the *Merrimac, Colorado, Wabash, Minnesota* and *Roanoke.* They were 375 feet long, fifty-three feet beam, and of 5,200 tons displacement. Their batteries were of 11-inch Dahlgrens.

Recognition for some years had been coming from far and near. Commander A. H. Foote of the Navy, writing of the attack on the Barrier Forts, near Canton, China, 1857, says of Dahlgren's howitzers: "These pieces of our squadron have gained everlasting fame. The English and French say they are the best pieces that they have even seen." The commanding officer of the *Merrimac,* on her first visit to England, wrote: "Your guns were particularly admired, the naval and military men admitting that they were constructed upon proper principles. . . . Repeated applications were made for their dimensions, which, as a matter of course, we declined to give." Dahlgren's *Boat Armament* was now adopted in the Prussian Service. A most comforting form of recognition at home was that afforded by Congress in 1860, when though no additional rank was conferred he was granted the pay of the next higher grade.

A resolve, consistently adhered to and exhibiting Dahlgren's enthusiasm for his work and also his fine sense of obligation to the nation, was that he never sought any pecuniary advantage

through patents and royalties for his inventions in ordnance, and when Rodman and Parrott used his basic idea in their improvements in ordnance he took action to prevent the Navy paying them undeserved royalties.

Dahlgren's service in the Civil War will be dealt with rather briefly, though not because it was not of the first quality. At the outbreak of hostilities he unexpectedly received command of the Washington Navy Yard for the reason that all senior to him at this station, headed by Franklin Buchanan, had abandoned their duties and joined the Confederacy. As commandant of the yard it was his responsibility to patrol the Potomac and guard the capital, a work which often threatened to go quite beyond the means at his disposal.

In July, 1862, he was made chief of the Bureau of Ordnance, a post which had been offered him a year previous and declined, and seven months later he was promoted to the grade of rear admiral. About the same time he received the thanks of Congress for distinguished service in the line of his profession, improvements in ordnance, and exceptionally zealous and efficient work.

The affairs of the Navy had now reached the point when the cry of "on to Charleston" was comparable in its public intensity to that of "on to Richmond." Two unsuccessful attempts in force by the blockading squadron under Rear Admiral DuPont had resulted only in the press assuming an unreasonable tone. Thus, when Dahlgren took command in July, 1863, hoisting his two-starred blue flag on the *Wabash,* he realized that he was confronting a difficult and embarrassing situation. He must quiet, if possible, the public clamor, yet avoid the useless sacrifice of men and ships.

Dahlgren's reputation with officers of the Navy was that of a scientist rather than that of a sailor and fighter. They thought a gunnery man placed in high command at sea would not prove an efficient leader, but Dahlgren soon convinced all those about him that he was as good a fighter as he was a thinker, and he won their esteem and affection by his ability and personal bravery. He never required one to take a risk greater than he himself accepted. A characteristic action that was merely the beginning of his service for the next two years, showing the man of action, occurred on the fourth day after assuming command, when he led a bombardment

of Fort Wagner, during which the monitor *Kaatskill,* flying his flag, was hit sixty times by heavy shell.

Minor engagements followed at frequent intervals. The blockade was more strictly enforced. Sumter was hammered to a mass of ruins, and twice, at the request of the Department, Dahlgren held a council of his iron-clad captains to consider the advisability of entering Charleston. Courage was shown as much in resisting public opinion and not undertaking a foolhardy enterprise as it was in some of the great personal risks which he assumed.

In the early winter of 1864-65, Sherman, advancing from the west, invested Savannah, and Dahlgren cooperating with him, compelled the evacuation of both Savannah and Charleston.

There were critics who loudly expressed their disappointment that the fleet had not taken Charleston. The more sane view was expressed by Sherman in a letter to Dahlgren: "I now thank you in person for not having made the hazardous experiment, for when the time did come to act seriously, your fleet was perfect, well manned, and admirably suited to aid me in the execution of the plan which did accomplish the fall of Charleston, and more too."

Nor should this brief mention of Dahlgren's services in the Civil War be concluded without reference to what Dahlgren guns accomplished in the many other operations: they bombarded the Confederate forts at Hatteras Inlet; they won the victory at Port Royal; two 11-inch Dahlgrens on the *Monitor* checked the *Merrimac* in the beginning of her triumph and sent her back to Norfolk, her career ended; the 11-inch and 15-inch Dahlgrens on the monitors at Mobile Bay, with those on the wooden ships, captured the Confederate ram *Tennessee,* and enabled Farragut to take the approaches to Mobile Bay, just as they had won New Orleans for him. Passing over the other naval engagements of the war (in practically every one of which the Dahlgren guns were the main dependence in the Union ships), we come to the *Kearsarge-Alabama* duel. As the account of the battle appeared in London, the author, Frederick Milnes Edge, characterized it as "the first test of the merits of modern naval artillery." After giving the armament of each ship and discussing the firing he concluded: "The struggle was really decided by the two 11-inch Dahlgren smoothbores of the *Kearsarge* against the 7-inch Blakely rifle and the heavy sixty-eight-pound pivot of the *Alabama.*" He further de-

scribed it as "a contest for superiority between the ordnance of Europe and America," in which the latter showed a marked superiority.

Thus it was after the long hard test of the Civil War that the Dahlgren cast-iron smoothbore 9-inch and 11-inch guns were still the favorite ordnance. The rifled gun was not yet a success, nor had experience with breech loading rifles been satisfactory. Indeed, some years after the war, the British Navy, after making a thorough trial of this type at sea, reverted to muzzle loaders; not until 1875 did they return to the breech loading system.

After two years spent as commander of the South Pacific Squadron, Dahlgren returned, in 1868, to Washington as chief of the Bureau of Ordnance, but he never forgot his first love; and within a year, wishing for the more intimate personal touch with ordnance design and fabrication, he left the bureau for the Washington Navy Yard and Gun Factory, and here it was, eleven months later, that death came to interrupt this tireless worker.

Dahlgren is the father of modern ordnance and gunnery. He found the Navy asleep in all but seamanship; he aroused it, none too soon, and entirely changed guns and gunnery, as well as the construction of ships. He was a scientist and inventor as well as a sea-going officer of the first quality. He it was who contributed the first big guns and the first real sights, introduced the rifling of cannon and construction of ironclads, and took the initial step toward the all-big-gun armored warship; and he it was who organized the great Naval Gun Factory at the Washington Navy Yard that continues of first importance even today—a vital element in the Navy and just as significant in the recent World War as it was in the Civil War and the Spanish-American War.

The old-time Dahlgrens, which to our grandfathers seemed ponderous, awe-inspiring, have long since become but idle ornaments in the approaches of navy yards. Instead, so rapid has been the advance in ordnance that the guns of a full generation later, such as dealt destruction to the cruisers of Spain, have, in their turn, become obsolete; but this is merely evidence that the service has caught the spirit and followed in the steps of this progressive officer who strove all his life to perfect the great naval guns and the missiles which they fired. His career is not a romantic story. He achieved success, not by popular acclaim or dramatic surprises,

but by careful thinking and hard, persistent application. In his last hours his mind reverted to the naval profession and he said: "The officer should wear his uniform, as the judge his ermine, without a stain." This observation could be applied to few more fittingly than to Dahlgren himself. Two noble monuments bear his name—Dahlgren Hall, the ordnance and gunnery building at the United States Naval Academy, and Dahlgren, Virginia, our great naval proving ground on the Potomac.

SHIP VENTILATION IN 1741

By Lieutenant Commander A. M. Charlton, U. S. Navy

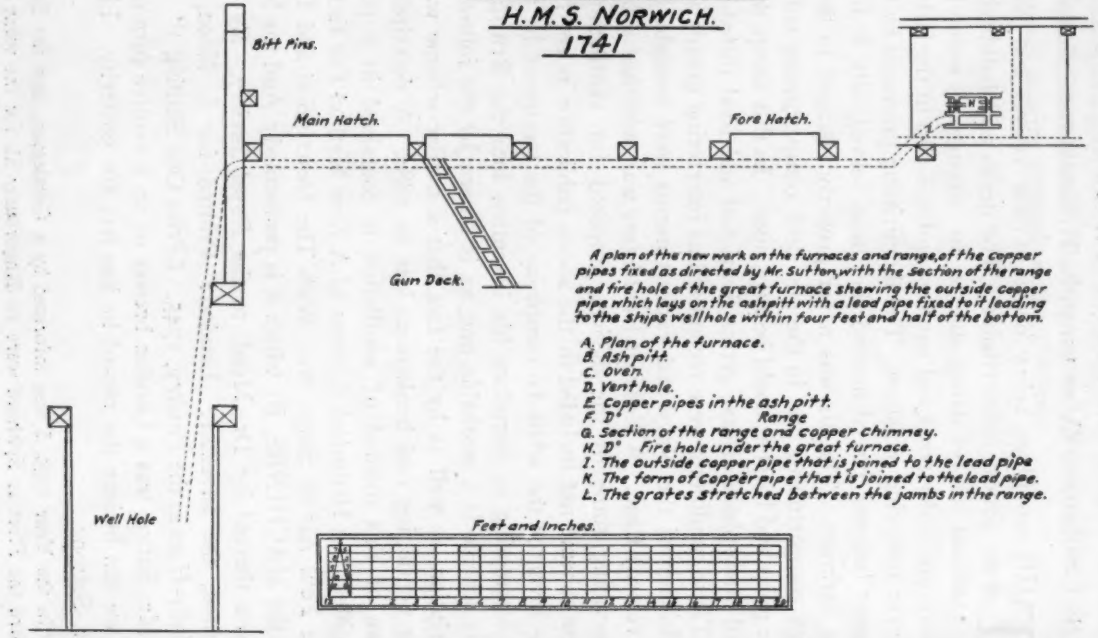
THE conditions below decks of war vessels 200 years ago were almost indescribable. The decks and bulkheads were almost always damp, due to the seepage of water through seams and leaky ports and hatches, and due also to the lack of dry air for removing moisture. The illumination produced by the few smoky lanterns placed around the decks served only to intensify the darkness. The air was never properly changed in the lower deck compartments and in the gun deck compartments only when the ports and hatches could be kept open. In this damp, dark and foul atmosphere disease germs flourished and food rotted.

These conditions were recognized as interfering greatly with the efficiency of the Navy and various means were brought forward to remedy them. A *Book of Ventilators* was published about 1735 describing some of the devices proposed for ventilating ships. One scheme not included in the above publication is set forth by the inventor the while he complains of the treatment he received in attempting to introduce his invention into the British Navy. His scheme is a workable one, as is shown by the following description, as well as by the fact that a similar scheme was used for ventilating coal bunkers as late as 1884. A description and plan of this method of ventilation is contained in a pamphlet entitled "An Historical Account of A New Method For Extracting the Foul Air of Ships, etc., With The Description and Draught of the MACHINES, By which it is performed: And the Relation given thereof by Dr. Mead, to the *Royal Society*. By Samuel Sutton, the Inventor. London: Printed for J. Noon, at the *White-Hart* in the *Poultry*, 1745. (Price One Shilling.)"

Mr. Sutton was a London brewer of an inventive turn of mind if we can believe the record he has left for posterity. Listen to Mr. Sutton:

"In the Year 1739, I was informed by a Gentleman, that the Sailors on Board the Fleet as Spithead were so dangerously ill, for the want of fresh

VENTILATING SYSTEM.
H.M.S. NORWICH.
1741



A plan of the new work on the furnaces and range, of the copper pipes fixed as directed by Mr. Sutton, with the section of the range and fire hole of the great furnace shewing the outside copper pipe which lays on the ashpitt with a lead pipe fixed to it leading to the Ships Wellhole within four feet and half of the bottom.

A. Plan of the furnace.
B. Ash pitt.
C. Oven.
D. Vent hole.
E. Copper pipes in the ash pitt.
F. D° Range
G. Section of the range and copper chimney.
H. D° Fire hole under the great furnace.
I. The outside copper pipe that is joined to the lead pipe
K. The form of copper pipe that is joined to the lead pipe.
L. The grates stretched between the jambs in the range.

Air, that they were put ashore to recover their Health; and the Ships to which they belonged stunk to such a Degree, that they infested one another. In Compassion to my Fellow-Creatures, I thought myself obliged to do all that was possible for their Relief in these unhappy Circumstances, and from this Time tried what could be done by Fire. I at length found, that by stopping the Air out of a Room that had three Fire-Places, and making two large Fires in two of them, I could bring the Air to draw down the third Chimney, with such Force as to put out a Candle. I then lighted a Fire in the other Chimney; which so rarified the Air in the Room, that the incumbent Air pressed to enter in, and with a Force sufficient to raise a Pulley with Half a Hundred Weight; and as soon as the Room was cooled, by the coming in of the Air, the Door was shut, and then opened again in three Minutes."

Mr. Sutton's statement that his great fire would raise fifty pounds on a door seems a little large upon investigation, but it could be done. Let us suppose him a prosperous brewer with a large house so that his chimney top was sixty feet above his open fire. The theoretical draft obtainable from a sixty-foot stack with a "large Fire" is about .35 inch. Due to various losses the available draft is about .28 inch in the grate. This draft will produce a pressure of about .01 pound per square inch or 1.44 pounds per square foot. To get a fifty pound pull from the stack suction he would need a door some eight feet by four and the hinges would have to be well oiled at that.

"Having proceeded thus far with good Success, I stopped up all the Chimnies in the House, the Garret excepted, and then lighted two large Fires, which drew the Air down the Chimney with such Violence as to put out four or five Candles immediately; whereupon I concluded that, a Fire being always kept on Board a Ship, and a Pipe or Cavity made to the Well, one End of it being heated by Fire, a change of Air would follow, and that by this Means rendered sweet and pure, and fit for Respiration.

"From this Time I made it my Business to consult the Officers and Sailors of the Navy, who all agreed that such a Change of Air would be of the greatest Use imaginable, in preserving the Lives of the Men on Board His Majesty's Ships. I particularly remember, that, being at a Coffee-House near the Admiralty, I placed myself nigh some Gentlemen of the Navy, and enquired of them, as I had before of others, as to the Usefulness of the fore-mentioned Change of Air, who all, to a Man, acknowledged that it would be of the utmost Service; and, upon their unanimous Approbation of it, I told them, that I could procure such a Change of Air; upon which one of the Company went to another Table, and the rest followed him; and I heard him tell the others, that he heartily pitied me, as being really mad, and out of my Senses."

This unexpected treatment resolved Mr. Sutton to apply to "some Person of Consequence in the Navy" so that he might get a trial of his idea aboard ship. Through his acquaintance with one of the commissioners of the navy, he obtained a letter from the Admiralty to the Surveyor of his Majesty's Naval Works, Sir Jacob Ackworth. I gather from other contemporary naval references to this gentleman that he was a rather difficult person to deal with, and his treatment of Mr. Sutton was no exception. Sir Jacob apparently did not care much for Mr. Sutton's idea after reading the letter of introduction, for he kept him waiting several days and then "was pleased to express himself in the following words: 'Sir, I suppose you intend to throw Air into the Wells of Ships.' " When the device was explained to him and he was asked to "appoint a Time for an Experiment to be made of my Scheme," he replied, "That no Experiment should be made, if he could hinder it."

This disappointment failed to daunt our inventor, for he went right back to the Lords of the Admiralty and obtained an order to have an installation made on the *Greenwich,* a man-of-war lying at Woolwich. " . . . pursuant thereto, to the Satisfaction of myself and all on Board the Greenwich, I placed the Pipes and all Things necessary to my Experiment, except the Soldering of two Pipes; But, whilst the Solder was hot and the Plummer in Readiness to solder them, a Messenger from the Builder of His Majesty's Yard came to order the Workmen ashore."

The surveyor was beginning to "hinder it." The joints were never soldered, but Mr. Sutton tried out the system the next day nevertheless, " . . . and as soon as I put the Candle to the Ends of the Pipes, they immediately extinguished the Flame: Which fully convinced those on Board of the great Usefulness of my Invention." The experiment was scarcely concluded before workmen arrived to take down the pipes and to plug up the holes.

Was Mr. Sutton through? Did he decide that sea-going conservatism could not be broken through and resolve to let the navy continue to breathe its foul air? Not at all. He took another tack and got the backing of the medical profession and interested the scientists of the Royal Society. Dr. Mead, the King's physician and a fellow of the society, communicated an account of the in-

vention and method to that body. His version of the properties of air as well as his description of the apparatus is quite interesting.

"It is found by daily Experience, that Air shut up and confined in a close Place, without a Succession and fresh Supply of it, becomes unwholesome, and unfit for the Use of Life.

"This is more sensibly so, if any stagnating Water be pent up with it.

"But it grows still worse, if such an Air as this is made use of in Respiration, that is, becomes moister and hotter, by passing and repassing through the Lungs.

"These bad Effects, in different Degrees, according to the different Manner in which Air is inclosed, are observed in many Cases; particularly in deep Wells and Caverns of the Earth, in Prisons or close Houses, where People are shut up with Heat and Nastiness: but most of all in large Ships, in which, with the Stench of Water in the Hold, many Men being crouded up in Close-quarters, all the mentioned Circumstances concur in producing greater Mischief than would follow from any of them single.

"The reason of these bad Effects is this: It is that Property of the Air which is called it's Elasticity or Springiness, which makes it so useful to our Life. When any part of it is inclosed and kept from the Communication of the outward Air, it expands itself, and, in Proportion to the Closeness of the Place, loses it's Spring; and if any Heat or Moisture comes to it, the elastic Force may be quite lost and destroyed. And not only so, but if it happens to be impregnated with noxious Effluvia, either from unwholesome Substances of any kind, or from the infectious Breath of diseased Bodies; it will become quite poisonous and deadly, in a manner suitable to the original Cause.

"It is proposed at present to find out a Remedy for this Evil in Ships only: but by making Alterations according as particular Places require, the same may be applied to any Houses or Parts of them, as Prisons, the sick Wards in Hospitals, &c.

"Now it is a natural Consequent of the Elasticity of the Air, that when it is rarefied in any Part, (which is most effectually done by Heat) the neighbouring Air will rush that way, till this Part is brought to be of an equal Density and Elasticity with itself; and this again will be followed by the Air next to it; So that, if a Conveyance for Air be laid from the Hold or Well of the Ship, and a Rarefaction of the Air therein be made; the foul Air from this Place will run or be drawn out that way, and fresh Air from the adjacent Parts, will succeed in it's room.

"It is upon these Principles that the following Scheme is most humbly offered to the Right Honourable the Lords of the Admiralty, and Commissioners of the Navy, which it is hoped will be found effectual for clearing the bad and corrupted Air from the Holds and other close Parts of His Majesty's Ships; and thereby prove beneficial to the Public, by preserving the Healths of many of His Majesty's good Subjects serving on board the same; the whole thing being indeed easy to be executed, and what will no ways incumber, or be troublesome, in any of the Vessels where

it shall happen to be applied; the same being, in short, no more than this: that whereas in every Ship of any Bulk there is already provided a Copper or Boiling-place proportionable to the Size of the Vessel, it is proposed to clear the bad Air by means of the Fire already used under the said Coppers or Boiling-places, for the necessary Uses of the Ship.

"It is well known, that under every such Copper or Boiler, there are placed two Holes separated by a Grate; the first of which is for the Fire, and the other for the Ashes falling from the same; and that there is also a Flue from the Fire-place upward, by which the Smoke of the Fire is discharged at some convenient Place of the Ship.

"It is also well known, that the Fire once lighted in these Fire-places, is only preserved by the constant Draught of Air through the forementioned two Holes and Flue; and that if the said two Holes are closely stopped up, the Fire, though burning ever so briskly, is immediately put out.

"But if after the shutting up the above mentioned Holes, another Hole be opened, communicating with any other Room or airy Place, and with the Fire; it is clear, the said Fire must again be raised and burn as before; there being a like Draught of Air through the same, as there was before the stopping up of the first Holes: this Case differing only from the former in this, that the air feeding the Fire, will now be supplied from another Place.

"It is therefore proposed, that in order to clear the Holds of Ships of the bad Air therein contained, the two Holes above-mentioned, that is, the Fire-place and the Ash-place, be both closed up with substantial and tight iron Doors; and that a copper or leaden Pipe, of sufficient Size, be laid from the Hold into the Ash-place, for the Draught of Air to come in that way to feed the Fire. And thus it seems plain from what has been already said, that there will be from the Hold a constant Discharge of the Air therein contained; and consequently, that that Air so discharged must be as constantly supplied by fresh Air down the Hatches, or such other Communications as are open into the Hold: whereby the same must be continually freshened, and it's Air rendered more wholesome, and fit for Respiration.

"And if into this principal Pipe so laid into the Hold, other Pipes are let in, communicating respectively either with the Well or lower Decks; it must follow, that Part of the Air consumed in feeding the Fire, must be respectively drawn out of all such Places, to which the Communication shall be so made."

The support of the Royal Society enabled Mr. Sutton to obtain an order from the Admiralty for another trial. This time he fixed on a hulk at Deptford "because that was immovable and could not, like a Ship, be sent away." When he arrived at Deptford he found that "Workmen belonging to the King's yard were busily employed in trying the Usefulness of another Machine, industriously set on

Foot to supplant mine." Evidently Sir Jacob had a hand in this for it was done without orders from the Admiralty. The hindering went on, too, for when the installation was finished, Mr. Sutton found that the pipes had been made of wood, with so many gaping cracks that if they had not been stopped up with paper and size, the air leaks would have effectually killed all suction at the ends of the pipes.

"At length, in September 1741, the Day appointed for the Trial of my Experiment came; when the Lords of the Admiralty, the Commissioners of the Navy, Dr. Mead, Martin Folkes, Esq; and several other Members of the Royal Society, being present on Board the said Hulk; Sir Jacob Ackworth was pleased to say, in the Hearing of them all, 'I am sorry that you are come to see the Trial of such a foolish Experiment, that I tried myself Yesterday, and it would not shake a Candle.'"

This must have been a pure fabrication on the part of Sir Jacob and a foolish one too for he hardly could have expected the assembled committee to believe him and go away without waiting for a trial of the apparatus. The experiment was quite successful, the end of every pipe blowing out a candle as Mr. Sutton said it would " . . . and all the Lords and Gentlemen aforesaid . . . expressed their Approbation of the Performance."

After a wait of two months, Mr. Sutton was given an order to equip a sea-going vessel with his apparatus and he journeyed down to Portsmouth where the *Norwich* was fitted up as he desired. The figure shows the ventilation system as installed on that vessel.

As can be seen from the figure, the galley range was situated under the forecastle, with a stack to take away the smoke extending up above the deck, probably at least six feet. This would give a total stack height above the grates of about ten feet. This height would give a natural draft of .05 of an inch of water. Such a draft will produce velocity of almost 900 feet per minute. The pipe shown on the sketch leading to the well was six inches in diameter, and it was only one of several fitted. On a length of fifty feet as shown on the figures, about 150 cubic feet per minute could be drawn through this pipe to the ashpit of the galley range. If we add 100 cubic feet per minute as the capacity of other pipes fitted, there would be 250 cubic feet of foul air per minute drawn out of the lower deck compartments and discharged into the furnace for combustion. In these days of 10,000 cubic-foot blowers

this amount of fresh air seems pitifully small. However, it was just that much better than nothing, and, as will be seen, was adequate for the health of the crew. Let us see now if enough air was coming into the furnace to burn the fuel necessary for cooking. Assuming that the fuel used in the galley of the *Norwich* was oak, the amount of air required to burn a pound of this wood is about six pounds or eighty cubic feet. A cord of four-foot white oak firewood will contain about seventy-five cubic feet of solid wood, which will weigh some 3,750 pounds, total. Three hundred thousand cubic feet of air will be required to burn it. Our pipes will supply more than this much air in the course of twenty-four hours, so there was no dearth of air for combustion. As a matter of fact, a quarter of a cord of wood a day was probably quite an ample for the simple cooking and water heating required, so that the cooks found it necessary to choke down a bit on the various pipes to prevent too hot a fire being produced.

When the installation was completed, Mr. Sutton waited for a satisfactory report but to his disagreeable surprise was "acquainted that no Report could be made till the *Norwich* returned from its Voyage; which was sent to Guinea and from thence to the West Indies, which constrained me to repent of my Journey."

With an eighteen-month wait ahead of him, Mr. Sutton returned to London and requested the commissioners of the navy to make a report of what he had done, . . . in order that I might receive a suitable Reward for my useful Invention, and reasonable satisfaction for my Trouble, Loss of Time, to the Neglect of my other Affairs, and Expences in the Execution of the same."

Due to the sudden change in the Ministry which occasioned a change also in the Admiralty, Mr. Sutton heard nothing until the return of the *Norwich* in June, 1743.

Captain Gregory of the *Norwich* made the following report:

"As to the Air-Pipes which were put on Board of me. I was obliged to stop up two of them, by Reason the Fire came down between Decks: the other to the Well was kept open, but the Ship making Water enough to keep her sweet, I was not able to judge of their Use, having been so healthy as to bury only two Men all the Time I was on the Coast."

Mr. Sutton complained bitterly of this report, writing to the Earl of Winchelsea and to Sir Jacob Ackworth, but it was not

until October, 1743, that he received the following order from the Lords of the Admiralty:

"Mr. Treasurer,
No. 2619.

1743 In Pursuance of an Order from the Right Honourable the Lords Commissioners of the Admiralty, dated 22 October 1743, signifying that, whereas Mr. Samuel Sutton did, some Time since, propose to that Board an Invention of his, for Extracting the foul Air out of Ships by Fire, and letting in fresh Air, an Experiment of which was ordered to be made on Board His Majesty's Ship the Norwich, bound to the Coast of Africa; and Captain Gregory, who commanded the said Ship, having since his Return, made a Report thereof, a Copy of which their Lordships sent us therewith, whereby it appears, that it does not, in all Respects, come up to the Expectation, and that the Use thereof is dangerous, and liable to Accidents by Fire: Yet, as the said Mr. Sutton has employed a great deal of Pains and Time about the said Invention, for the Benefit of the Navy, and had Encouragement from their Lordships so to do; and their Lordships being desirous to give Encouragement to Persons who shall turn their thoughts to any Inventions, that may tend to the Advantage of the Navy, do hereby desire and direct us to cause a bill of one Hundred Pounds to be made out to the said Samuel Sutton, as a Reward for the Loss of Time and Expences he has been at about the said Invention."

"We pray you to pay unto Mr. Samuel Sutton accordingly, the Sum of One Hundred Pounds, dated 22 Oct. 1743."

This £100 and a fourteen-year patent were the results of Mr. Sutton's four years' experiments with the ventilation of ships, even though, as he said, " . . . the Simplicity of the Machine; it's easy Stowage without being cumbersome; it's Operation without any Labour to the Seaman; the small Expence to put it in Execution, and maintain it; besides it's Tendency to preserve the Health and Lives of the Seamen, to keep the Ship dry, and the Merchandize from damaging; are strong Reasons why no Ship should go to Sea without it."

He probably wished he had devoted himself to developing a new variety of beer.

LEVIATHANS OF ANTIQUITY

LIEUTENANT T. L. SCHUMACHER (CC) U. S. N.

A CASUAL glance at the map of the Mediterranean and its surrounding lands will force the conclusion that any nation which has dominated these lands must surely have been a seafaring people. The most cursory study of ancient history verifies this conclusion. Indeed it appears that the very success and power of those nations, Egypt, Phoenicia, Greece and Rome, which successively dominated the then civilized world, was the reward for their proficiency afloat and the decline of each of these powers followed quickly and surely when her men ceased to hear the call of the sea.

To modern nations the lessons drawn from the histories of these sea powers of by-gone days are of inestimable value and, fortunately, the stories of their great naval battles are largely preserved; but of at least as great interest and value should be the stories of the ships in which those battles were fought; for just as our language, our science, and our philosophy are descendent from those of these ancients, so are our modern warships and merchantmen, the lineal heirs of the galley and the carrack of the Mediterranean. It is, therefore, with some disappointment that we find little is told us of those ships of the past. Their story never has been, never can be, more than scantily told; still we can now and then glean from the classics glimpses of those ships which were once the pride of the sailor and the marvel of the landsman; and then, as now, there was nothing of which the sailor was more proud than a huge, fine ship; nothing at which the landsman marveled more than a leviathan.

The most widely known vessel in history, the Ark, was the first leviathan, but so little is known of her that we can be certain of nothing more than her bare existence. Her length has been variously given as from 450 feet to 9,000 feet. Of her form and

proportions we can say little, although the Greek version of the flood describes her as "box-like."

The next leviathan is no less a subject of controversy than is the Ark but the abundance, rather than the lack, of information about that great galley of Ptolemy Philopater has been the cause of so much speculation and debate. Ptolemy Philopater, who lived during the second century before the Christain era, was the first of those pleasure loving Ptolemies who marked the decadence of a long line of powerful monarchs. To satisfy his love of pomp and show of power he built, or perhaps it would be better to say, had built, a huge galley "which was 420 feet in length, fifty-seven feet in breadth, and nearly eighty feet in perpendicular height, from the tafferel to the keel." Such dimensions are of a ship about the size of our transport *Argonne*. They seem extreme, and were Plutarch, who is quoted above, our only authority, we would mistrust their accuracy. Contemporary writers, however, verify this information in substance. Moreover, a Roman barge 450 feet long, which was built some 200 years after Ptolemy, is still extant. To be sure she is not a war galley, as Ptolemy's vessel is supposed to have been, but she was at least a floating hull, which proves that, improbable as are Plutarch's figures, still we are not justified in branding them as being so inaccurate as to deserve no further consideration.

Incredulous as we may be about these dimensions we become even more skeptical when we read that Ptolemy's galley was propelled by "forty banks of oars." According to the commonly accepted idea, a bank of oars is a complete tier or row. Now the galley, the war ship of that day, differed from the merchantman principally in that the latter relied chiefly upon its sails for motive power while the galley's chief form of propulsion was the oar. It can readily be seen that a vessel of such size as Ptolemy's would require a large number of oars and rowers, but even a modern architect's ingenuity would fail at the problem of designing a vessel so as to permit the use of forty banks or rows of oars and a modern sailor would be hard pressed to manage such a vessel were it built. How, then, could such an arrangement be designed and operated 2,100 years ago? Many suggestions have been made to solve the riddle, none of which are entirely satisfactory. Perhaps our interpretation from the original language

has resulted in an exaggeration, yet ample evidence seems to contradict this supposition. Perhaps Plutarch, being unused to the sea, misquoted his authority, yet there are other writers who verify his version—indeed Pliny states that there were not forty, but fifty, banks of oars. We are more than ever skeptical of such a story when we examine the extant pictures and representations of ancient ships and find that never are more than three banks of oars shown; yet, we have undeniable evidence that sixteen banks were not uncommon, and so, like all those before us, including Plutarch himself, we leave the secret of the forty banks of oars untold.

If we wonder that such a vessel as Ptolemy's galley should have been built, we are even more impressed when we are told "she had 400 sailors and 4,000 rowers, and afforded room besides for very near 3,000 soldiers to fight on her decks." Her total complement was, then, some 7,400 men; about six times that of the *California.* Incredible as the figure is we at least learn of the composition of the crew. By "sailors" is meant the deck hands, those who handled the lines, the helm, acted as look-outs, etc. The rowers were, of course, the slaves who manned the oars. Neither sailors nor rowers were supposed to be fighters—that duty fell only to the soldiers who constituted an armed land force embarked on the vessel; wherein we glimpse, perhaps, the origin of our own marines.

Of this remarkable vessel we are told by some versions that she was "furnished with fountains, gardens, a theater, and four markets." Such statements are, however, clearly due to errors in translation from the original account. So much are we told of this great ship of Ptolemy Philopater. What are the facts? Were it not for the enormous crew of soldiers and rowers we would decide that she was a huge barge built as a pleasure boat on which Ptolemy could entertain his retinue of friends in lavish style. Plutarch himself seems to verify such a conclusion, for he says, "But this, after all, was for show, and not for service, scarcely differing from a fixed edifice ashore, and was not to be moved without extreme trial and peril." With this, his final remark, he somewhat relieves the incredibility of his account of this vessel which existed some twenty-one centuries ago. We conclude that this story of the galley of Ptolemy is, like many

other stories in the classics, part fiction, part truth, and we are unable to sift the one from the other.

But if we may be permitted to entertain some doubt as to the truth of the story of Ptolemy's galley we certainly must accept in its entirety the story of the next leviathan—that ancient freighter of Caligula which is reported to have carried the Vatican obelisk from Egypt to Rome. The obelisk itself stands today as mute evidence of the existence of some ship large enough to transport it, and the story of this huge vessel is told to us by one who most probably saw her himself.

The Vatican obelisk is one of the largest of the obelisks which have been removed from Egypt. It stands something over 100 feet high and with its four foundation stones, weighs very close to 500 tons. About 50 A. D. it was transported to Rome by the order of Caligula, then emperor of the Roman Empire. To transport such a shaft of stone (for it was transported as a single piece), with its foundation stones, across the Mediterranean required a vessel which at that time was a marvel in size. Pliny, who was living when the feat was accomplished, tells us of this ship—"Certain it is, that a more wonderful ship than she never was known to float upon the sea. She was balasted with 120,000 modiz (about 800 tons) of lentils." The tonnage of this vessel must, therefore, have been something better than 1,300 tons—a fair sized cargo vessel of today. Unfortunately, Pliny does not go much into the description of the vessel herself except to assure us that she was built expressly for the purpose of transporting the obelisk and that the task was a most difficult one. He does mention, however, that her mast "was seen to be of a wonderful and inestimable height above all others" and he further tells us that this mast was nearly eight feet in diameter at the foot. Such a huge mast was undoubtedly fitted to be used as a derrick in handling the obelisk on and off the boat.

Of the vessel itself we are told that it was kept at Ostia, the port of Rome, for a number of years "to be seen, for it was the most admirable carrack that had ever been known to float upon the sea." Claudius Caesar, so Pliny says, later " caused it to be sunk for the safety and security of the haven, and thereupon he raised certain piles or bastions, like turrets or skonces, with the

sand of Panteoli*." It is probable that this great vessel was utilized as a dam across the old channel of the river Tiber so as to direct the flow into the new channel which had been lately completed under Claudius' direction with a view of improving the facilities of the port.

We come now to a somewhat less romantic, but none the less interesting, leviathan—the Roman corn-ship *Isis* of which we are

From: Torr's Ancient Ships

FIG. I—ROMAN MERCHANTMAN, 200 A. D.

given a clear description by Lucien. He describes this "great Egyptian corn-ship" as she appeared to a marveling crowd of spectators at the Piraeus where she had been forced to put in, having been forced out of her course by a severe storm. This *Isis* was a merchantman, probably operated under charter of

* Sand of Panteoli was a natural cement much used by the Romans for concrete work.

the Roman state to carry grain from Egypt to Rome; a very lucrative and extensively cultivated trade.

Of the general form of these merchantmen we are quite familiar from such representations as Figure 1. This figure is a copy of a relief found near the mouth of the Tiber river. It represents a contemporary Roman merchant vessel which, although much smaller than the *Isis*, is typical of the cargo carrying vessels of that day. A study of this figure will disclose many of the details of such vessels, although proper proportions are not, of course, maintained. It may be of interest to note some of the most prominent details shown. The first is the rudder, which consists of a large steering oar secured on the starboard quarter and turned about its axis by means of a tiller. The rig consists of mainmast with square sail and an inclined foremast, not a bowsprit, called the "artemon," from which a square foresail was hung. In the figure this mast is being used as a means of mooring the ship to the dock. The "stern cabin" or stern castle is also clearly shown—a detail peculiar to Mediterranean vessels for many centuries. Other details shown are the standing rigging, the brails, the rudder bands, the decorations on both hull and sail. It is also interesting to note that in the background is clearly depicted a crude form of lighthouse with its signal fire on top. That the Romans did maintain such navigation lights is verified by the historians.

Such figures are of inestimable value and interest in depicting details of construction but are unreliable as regards proportion and size. Of the *Isis*, Lucien tells us that she was "180 feet long, and something over a quarter of that in width; and from deck to keel the maximum depth, through the hold, forty-four feet. And then the height of the mast, with its huge yard, and what a forestay it takes to hold it!" Further on he mentions "the ornamental details, the paintings and the scarlet topsail;" "the anchors, and the capstans and windlasses, and the stern cabin. The crew was like a small army and they said she carried as much corn as would feed every soul in Athens for a year."

It is of interest that such vessels as the *Isis*, being merchantmen, were built much larger than the galleys, or warships. In particular they were much deeper and broader so as to increase their cargo carrying capacity. They were not fitted with as many

oars as were the galleys, but relied chiefly upon sails for propulsion. These merchant vessels sailed at night, unlike the galley which put ashore at dusk and resumed its travel the following dawn, a practice which, of itself, shows how closely these ancient sailors kept to the coast line, as, indeed, they must, for the lack of compass, sextant, chronometer, and even a knowledge of astronomy necessitated that practically all of their navigation be coastal. But with all their limitations these sailors developed their knowledge and skill far beyond those arts practiced ashore, and the sailor of today has little difficulty in discovering that his leviathan is a direct descendant of Ptolemy's galley, Caligula's freighter, or the corn-ship *Isis*.

SPECIAL NOTICE

WHAT'S THE REST OF THAT?

A "Sidekick" from another destroyer drops in to have a cigarette with you after lunch. Just as you pass him a light, a bray comes out of one of the J.O. rooms up forward, where they are double decked, and where boots and raincoats, golf clubs and tennis rackets vie with one another for Standing Room Only in any corner or crevice. It's a j. g., to whom Providence was good, and who has had a hitch through the Mediterranean and up the China coast before he came to lengthen out your watch list—

"Now the monkeys have no tails in Zamboanga—
The monkeys have no tails in ZambO-O-O-ANGA!"

"Come out here!", the Sidekick calls out. "What's the rest of that? I've been trying to find out for years."

"How do you do, Sir," from the j. g. "I don't know the rest. I just heard that much coming down to the dock one night from the Manila Hotel, and it stuck in my head."

"There you are," says the Sidekick. "None of them know it all."

Well, there is a project afoot to pierce this veil of ignorance and to gather together in one place all these old songs, of which everyone knows one verse, but of which only the gifted know more. The Trident Literary Society, at the Naval Academy, publishers of that interesting new magazine *The Trident* are engaged in making this collection.

The idea is to get together a hundred odd of the best and most typical of all these old songs we sing in the Navy; to put them into a book with the music, the words, and wherever possible a brief history of the songs, where and under what circumstances they were written, who wrote them, and what events, if any, they commemorate, etc.

This cannot be done without the cooperation of all hands. All of us know some of these songs, some know many. The Editors request that anyone who knows any, copy them out and send them in with the music, if it is known, or if the bandmaster can write it out, but without it the words will still be very welcome; some one will be found who will know the music.

Also if you have any suggestions regarding such a book, or know of songs that should go in, but of which you may not know the words, or if you know any good sources of such songs, send the information along. It will be welcome and will help to make complete the Navy's own songbook.

All communications should be addressed to *The Trident,* Bancroft Hall, U. S. Naval Academy, Annapolis, Maryland.

DISCUSSION

Promotion of Officer Personnel

(See page 183, February, 1925, PROCEEDINGS)

CAPTAIN R. C. SMITH, U. S. NAVY, RET.—This paper points out very clearly some of the undesirable features of the present laws governing promotion in the line of the Navy. Naturally, it is realized that not all officers can reach the higher ranks, and that in pursuance of this principle individuals must be sacrificed, but in such sacrifice the main desideratum should be equality of opportunity. This is the great American principle in all walks of life.

Captain Campbell shows that under present laws this equality of opportunity does not exist. It is a fact, however, that is apparent and recognized; the problem is how best to overcome it.

One very helpful measure would be to reduce very materially the limit of age of admission to the Naval Academy. Four years is much too wide a limit, and there is no necessity for it. It seems to have been based originally on the fact that members of Congress had only one appointment to the Naval Academy and that the course was four years. Hence, unless the limit of age was four years, many boys in each district would have been ineligible even for consideration. Now, with apparently a minimum of three appointments for each congressman or senator, there seems no reason why the limit should not be reduced to two years at most.

This brings us to age-in-grade or length of service as a basis for promotion and retirement. If the margin of entry is small there is no practical difference in the two; but an artificial system has been created all through the list by the original assumption that a margin of four years could be allowed for the performance of similar duties up to the rank of lieutenant. (Ensigns must serve three years and lieutenants (j.g.) at least three years before they can be promoted.) The same assumption should, therefore, be carried all the way to rear admiral. Final retirement is fixed by the age limit of sixty-four years, which cannot well be changed for the Navy alone.

With promotion by selection and age-in-grade retirement, the older men in each class are at an unquestioned disadvantage (unequal opportunity, contrary to American principles), and the younger men have a corresponding advantage. But the assumption has been made that a four years' variation in age can be permitted without interfering with the performance of duty. Hence the young and old men in a class should be given an equal opportunity. This means length of service and not age as the basis, at least until the age limit at the Naval Academy has been suitably reduced.

Next, as to the length of service in the different grades: Captain Campbell shows that a seven-year period lends itself to a greatly increased simplicity in details for duty. The plan might be carried all the way through—seven years to lieutenant (three as ensign, four as lieutenant, j.g.), seven to lieutenant commander, seven to commander, seven to captain, seven to rear admiral, and seven on the average in the grade of rear admiral, or forty-two years in all (twenty-two to sixty-four on the average).

Next as to selection up or selection out. This was quite fully discussed by the present writer in his article in the last August PROCEEDINGS, "Some Thoughts on the Line Personnel Situation," in which the conclusion was reached that selection out, with possibly a small sprinkling of selection up, was far more practicable, more in keeping with the naval organization, and not at all dissimilar to the practice in civil life. This does not prevent selection for duty; in fact, it helps it; nor does it prevent any amount of selection for high command in time of war, in accordance with existing law.

Captain Campbell adopts selection out, which, if the above conclusion is correct, is not open to criticism. As a modification in the old Personnel Act of 1899, he proposes the transfer of the officers who are selected out to the Fleet Naval Reserve. This appears to be the real solution of what to do with such officers. They remain available for war service, and keep in touch with actual conditions in the Navy through their annual periods of training.

There is a slight cumulative discrepancy in the required number of eliminations that would result from the wording of the proposed law, but this can easily be corrected. As a matter of fact the simplest solution is probably to promote for length of service, and remove the actual resulting excess each year by eliminations from the whole grade, subject to minor provisos to guard against drastic elimination of "humps," or other wide variations in the size of classes.

As a whole, the plan appears to have very excellent features which could well be considered in any proposed change in existing law.

Proposed Administrative Changes in Navy Department

(See page 357, March, 1925, PROCEEDINGS)

CAPTAIN W. G. DUBOSE, (CC), U. S. NAVY—Commander Fisher conveys the impression in his article that his proposed remedy for Navy Department organization is simple and easy of application. "To accomplish these ends it is simply necessary to make a corresponding redistribution of the duties of the Navy Department." If that were all, perhaps the problem could be easily solved, but is it probable that eight bureau chiefs will ever be brought to an agreement as to a redistribution of the duties of their bureaus? Perhaps, but based on past experiences with boards and informal conferences, it is doubtful of accomplishment and the process, in some cases, will be far from painless. Commander Fisher says, "No dis-

astrous upheaval is required." That I very much doubt. There must be an upheaval if any real improvements are to be made, and although, if the changes are made wisely, in the end there should be nothing disastrous, they cannot be anything but radical and disastrous to some bureaus or to some of our present ideas. But, be that as it may, I find no difficulty in agreeing with Commander Fisher that present conditions are unsatisfactory and that a remedy should be found.

The symptoms of our present disease have been evidenced for years, principally at navy yards, because it is there that a very large part of our money is expended and because there our errors of organization and administration have been more in evidence, but at the Navy Department itself there has been no lack of symptoms. In the past the actual steps taken to bring about improvements in organization have been made mostly at the navy yards or in connection with the navy yards, although there have been many suggestions as to changes that should be made in the Department itself, and some changes actually have been made. The reason for the activity with respect to navy yards has undoubtedly been the relative ease with which changes could be made in their organization, no legislation being required, while at the Navy Department legislation is required if anything of importance or permanence is to be contemplated.

The radical change in navy yard organizations made in 1909 has been followed by many others of more or less magnitude, the last definitely ordered change of consequence being that covered by General Order No. 53 of June 16, 1921, which established a system of organization and methods of administration to become effective July 1, 1921. In the twelve years from 1909 to 1921 it might be expected that service opinion would have become crystallized and that the order of 1921 would have resulted in a type of navy yard organization the same at all yards as regards major parts, but this is far from being true and the navy yard situation today, while far from being as bad as in 1921, when we had as many different kinds of organization as we had navy yards, still leaves us with several different kinds of organization and the situation is not generally accepted as satisfactory.

Is it too much to believe that if Secretary Long's proposal, made in 1899, for a consolidation of the Bureaus of Construction and Repair, Steam Engineering and Equipment, had been adopted, or that if following the Newberry Navy Yard consolidation, a happier solution of departmental control of navy yards had been provided, we would still be dissatisfied with our navy yard situation? I think it doubtful, for I believe that with an unbroken "chain of authority, responsibility and control of funds" resulting from a properly organized Navy Department, the navy yard problem would have been solved.

Commander Fisher may consider the navy yard situation generally satisfactory, now that we have a navy yard division established by General Order to handle navy yard matters in Washington. His article does not,

however, deal with the navy yard question but he proposes a remedy for only the departmental organization. This question of Navy Department organization, especially as regards matters connected with material, is, to my way of thinking, all important. If we ever get a proper organization in Washington, the navy yard question will give us but little concern.

Commander Fisher enunciates certain principles that should be met and then outlines his proposed organization. It would seem that there will be no difficulty in obtaining a fairly unanimous agreement as to his principles of organization but as to the proposed organization itself, it will be far from easy to secure general acceptance. Perhaps the author considers his principles of more importance than the application he has worked out and has made his article complete more by way of "starting something" from hoped-for discussion, than from the conviction of having arrived at a satisfactory solution.

I have long thought that we should have a single bureau or division in the Navy Department to have charge of the design, construction, equipment and repair of ships—a bureau that should control the working part of a navy yard in just the same way as the Bureau of Ordnance controls its ordnance establishments, the Bureau of Medicine and Surgery its hospitals, or the Bureau of Navigation its training stations. This idea is met in part by Commander Fisher's Bureau of Maintenance, although he establishes a separate Bureau of Design, a proposal I do not consider practicable, nor do I see how his principle of having one bureau "having complete charge of all navy yard activities" can be reconciled with having the Assistant Secretary of the Navy discharge the duties of "Departmental Administration of Navy Yards" and the Bureau of Maintenance have charge of "Operation of all Navy Yards."

On the whole, the article is most interesting to any officer who has given thought and study to the question, and it should help in crystallizing service opinions, first, that something should be done and, second, "What?" Until the service demand is sufficiently insistent that changes should be made it would seem from the experience of the past that any radical changes have little chance of early official consideration. But, sooner or later it is believed the demands of limited money for the Navy's work will force administrative changes in the Department and the navy yards. The solution of the question of what these changes should be is most important, and complete agreement may never be reached, but that difficulty should not prevent our giving most serious thought and study to it so that eventually we may adopt that form of organization which will produce the best results for the Navy from the viewpoints of economy and efficiency.

National Photo

DR. G. H. PETERS OF THE NAVAL OBSERVATORY AND THE CAMERA WITH WHICH HE PHOTOGRAPHED THE SOLAR ECLIPSE

National Photo

Dr. G. H. Peters of the Naval Observatory and the Camera with Which He Photographed the Solar Eclipse

PROFESSIONAL NOTES

Prepared by

Lieutenant Commander H. B. Hird, U. S. Navy

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GREAT BRITAIN

The Washington Treaty

Naval and Military Record, 3 December, 1924.—Will the Washington Treaty survive? The United States created the League of Nations, and then promptly disclaimed it. The United States created the Washington Treaty, and a large section of national opinion in that country has been protesting against it ever since. It must be admitted that the frequent accusations of British had faith, which form the principal theme of these protests, beginning to impose rather a severe strain upon the maintenance of the elementary conditions on which alone the continuance of the treaty is possible. There is a growing conviction on this side of the Atlantic that the weight of American opinion is against the treaty, and, therefore, would like to see it abrogated. How far such a conclusion is justified it is very difficult to estimate, for we only hear one side—the side of which William Shearer appears to have constituted himself spokesman—and it is quite possible that this side represents but a noisy minority.

The real test will probably come when Senator Hale introduces his promised bill for a more progressive naval policy, which he is pledged to do very shortly. He intends to demand the immediate laying down of eight 10,000-ton cruisers. There is nothing against this in the Washington Treaty, so long as they are not armed with anything heavier than 8-inch guns, and the proposal is only interesting in so far as it represents general policy. But he also intends to press for the conversion of the earlier battleships to the use of oil fuel, and to repeat the demand for increasing the fire elevation of their turret guns, so as to bring them into line with the latest British ships in this respect. Here we come right up against the Washington Treaty, which specifically states that no capital ships in existence at the time of its ratification are to be improved in fighting value.

It is quite in keeping with all British tradition in connection with international agreements that we should have sacrificed very much more than we gained under the Washington compact. For the first time in our long maritime history we waived the principle of naval superiority, and accepted naval equality with the United States in its place. The general American view is that we were only making a virtue of necessity: that had we refused to acquiesce, the United States would have wrested sea supremacy from us. That is as it may be. All we need to say is that since the United States is admittedly finding herself unable to maintain the equality, on reduced strength, which she herself proposed, it is by no means clear that she could have overtaken the British Navy in a deliberate rivalry. She was certainly preparing to build a great clutter of ships, but those who realized that mere tonnage alone does not constitute a fighting fleet foresaw that it would be impossible to man them. The old-time New England Yankee was strong in the sea instinct; the modern American isn't.

The United States gave up a great deal under the Washington Treaty; more, indeed, than perhaps she fully realized in the desire to carry the conference to a successful issue. Her abrogation of the right to develop Guam or the Phillipines into modern naval bases meant incurring a serious disability. These are two essential strategical points in any conflict in the Pacific. Japan, on the other hand, gained all that she wanted and probably rather more than she expected at the Washington Conference. Through sheer bland insistence she carried her point about being allowed to retain the new 33,000-ton dreadnought *Mutsu*. She likewise brought about the prohibition of any expansion of Hong Kong. The result is that, unless and until the Singapore scheme materializes, no other power but herself will have a first class battleship base in the Pacific.

There are very good reasons, therefore, why the Washington Conference should not be regarded in the United States as an undisguised blessing. But why this persistent effort to throw the odium for this unsatisfactory condition of things upon Great Britain? There is absolutely no legitimate reason for rivalry between the navies of the two countries. The imperative need of sea power to the British Empire is self-evident. The necessity for naval strength on a corresponding scale on the part of the United States cannot possibly be clear, since it does not exist. A great, self-contained nation, with a few very minor dependencies, cannot justify a parallel with an insular country in the perpetual normal state of being within a few weeks of starvation and a world-encircling chain of dominions.

In our view this process of incessant comparison with the British Navy is nothing more nor less than diplomatic bluff. Strategical vision in America is not directed toward the Atlantic, but toward the Pacific. But political instinct may deem it wiser not to suggest this: in fact, to try to obscure real meaning by false scent. Bluntly put, what Great Britain may think about these frequent references to her naval good faith does not much matter, since America is not contemplating the possibility of war with Great Britain. What Japan would think under similar circumstances might very much matter.

Since public opinion in America would demand some definite justification for heavy naval expenditure, the White Ensign is used as the red herring. This is all very well, but there is a public opinion on this side of the Atlantic, too, and this happens to be particularly devoted to the White Ensign. If the Washington Treaty is to continue, there must, at least, be an end to the direct allegations of bad faith against this country, which has sacrificed more and been more punctilious in carrying out its conditions than any other signatory power.

£300,000 for Reconstruction of "Renown"

The selection of the battle cruiser *Repulse* to convey the Prince of Wales to South Africa is no doubt due to the fact that the *Renown* is still undergoing reconstruction at Portsmouth. How extensive is this reconstruction is indicated by the fact that over £300,000 was spent on the work in the last financial year; £309,272 is the estimated expenditure on the vessel up to the end of next March, and a further sum will have to be spent during the following year. The *Repulse* has been at Portsmouth since she returned in September with the Special Service Squadron from the Empire cruise, and is to recommission at the end of December.

The *Repulse* is a sister-ship of the *Renown*, and, except in protection, the vessels are almost identical. They are war-time productions, and were originally laid down as battleships, but at an early stage of their construction were redesigned and given an additional length of about 170 feet, and completed as shallow-draught fast battle cruisers. They are imposing in appearance, and may be distinguished by their unequal funnels, the foremost having been raised after construction to clear the bridges. The *Renown* has been twice used by the Prince of Wales for his tours, but this is the first occasion on which the *Repulse* has been chosen for this service. One effect of the selection will be that for the present the *Hood* will be the only ship left in the Battle Cruiser Squadron.

The Most Costly Cruiser

Army, Navy and Air Force Gazette, 27 December, 1924.—There ought to be more than one record set up by the cruiser *Effingham* when she finally hoists the pennant as the flagship of Rear Admiral H. W. Richmond on the East Indies station next summer, but one which gives much food for thought is that of cost. Up to March next, this 9,750-ton ship will have absorbed about £2,074,526, or as much as it cost to build Admiral Jellicoe's flagship at Jutland, which is of 25,000 tons, and carries ten 13.5-inch guns in her main armament as compared with the seven 7.5-inch guns of the new vessel. It would be interesting to learn how much of this heavy expenditure, and it must be no small proportion, has gone in establishment charges and other liabilities, owing to the continued delays in her construction. The plea was, of course, that economy dictated the withholding of funds from such a ship; actually, the system followed has proved most extravagant in the long run.

Britain Has New Navy Auxiliaries

Washington *Star*, 16 January, 1925.—London, January 2.—Some formidable aerial auxiliaries to the British Navy are promised as the result of experiments, now nearing completion, which are being conducted by the air ministry and naval experts.

The most remarkable of the new types, according to the critics, is a huge armored "flying boat," which will be able to dispense with the assistance of airplane depot ships, and which will act as a single fighting unit. Sleeping and living accommodations for a crew of twelve, with food supplies for a month, are among the features of this monster, which is to be fitted with two marine engines, enabling it to progress under its own power when forced to, or desiring to, alight on the surface of the water.

All vulnerable parts are thoroughly armored, and the design permits nests of machine guns on the wings as well as in the hull, fore and aft. The crew will consist of a captain, three pilots, navigators, gunner-mechanics and wireless operators, and the machine is designed to range virtually at will on the service of the fleet, fighting, scouting or observing, as may be required. Practical flying tests with this type will commence shortly.

Another type is a six-seater waterplane for reconnaissance purposes, the tests of which have proved so successful that the air ministry has ordered the construction of six machines for immediate delivery. Fitted with four 450-horsepower Napier-Lion engines this huge "scout" is built of metal, and designed to permit alighting on the water in almost any circumstances without damage.

Several other designs, for open sea reconnaissance, "spotting" planes to aid the fleet gunners and marine fighters, with a wide operating range for tackling hostile aerial observers and fighters in naval operations, are in course of development, the main feature being, perhaps, the universal elimination of the "blind-spot" which has rendered previous patterns of seaplanes vulnerable to aerial enemies. All of the latest designs have machine gun nests to cover every angle above or below, so that the planes will be able to attack, or beat off attacks, from any position, without having to relinquish a particular job through having to maneuver to avoid aggressive enemy aircraft. The "blind spot" proved a great drawback to aerial observation or attack during the late war, as there were numerous positions from which an airplane could not properly defend itself. The modern plane must be capable of "bitting" all ways at once.

British Battleship "Monarch" to be Sunk

Washington *Post*, 7 January, 1925.—London, January 6.—The British battleship *Monarch*, doomed to the scrap heap under the terms of the Washington naval treaty, left Portsmouth today for its last voyage.

The strictest secrecy is maintained by the Admiralty regarding the means of disposing of the *Monarch*, but it is understood that it will be sacrificed to a test of a new British invention for naval warfare.

England's New Navy Units Called Floating Fortresses and Airdromes

Washington *Star*, 10 January, 1925.—London, January 10.—The design of the battleships *Nelson* and *Rodney*, now being built by Great Britain under the provisions of the Washington naval treaty, is so revolutionary, according to the *Daily Express*, that it marks the end of the dreadnaught era, just as the dreadnaught marked the end of the previous types.

The new ships will be entirely different from any others in the world, the paper says. Both will be floating fortresses and airdromes and will have a radius of action covering thousands of miles. Nine 16-inch guns will be mounted on each of three turrets, all forward. There will be no guns on the after part, which will constitute a flight deck, and the ships will carry their own flying corps and planes.

Another feature, the *Express* says, is that there probably will be no funnels, the products of the furnaces being discharged through pipes running alongside the stern.

The distribution of the armor also will be revolutionary. The magazines, like the guns, being all forward, the usual armor belt extending for three parts of the ship's length will be unnecessary and the weight saved on the sides can be added to the deck protection against high-angle fire and aerial bombs. There also possibly will be more than one armored deck, thus giving successive means of protection.

British Aroused by Navy Secrets Revelation in U. S.

Washington *Star*, 17 January, 1925.—London, January 17.—Pungent criticism of the United States Naval Intelligence Department for making public supposedly secret details of the two new British battleships, *Nelson*

and *Rodney,* is made in this week's issue of the *Naval and Military Record,* the leading service paper of Great Britain.

"Not for the first time do we find the United States giving to the world British naval information which has been officially denied to the British public," the paper says, continuing:

"We are entitled to wonder, seeing how much Captain Hough is able to tell the world about our new battleships, just how far the penetration of admiralty secrecy has gone and how he got his information.

"An officer of the United States Navy recently stated that by flooding one of the 'bilges' our battleships could attain a list which materially increased their angle of elevation and consequently the range of their turret guns, and that he had this from an enlisted man who succeeded in being on board one of our Atlantic fleet during battle practice. Such candid admission of the employment of spies is a little staggering."

Singapore Again

Naval and Military Record, 17 December, 1924.—As we confidently predicted at the time, the definite abandonment of the Singapore project by the Labor Government was really only a postponement, pending a change of administration. The brief, but sufficient, reference to the subject contained in the King's speech fully justifies this view. There can now be no question of a betrayal of confidence in stating that Singapore will figure in the next Navy Estimates, when money will be asked to replace the plant which was disposed of by the Socialist Government and to carry on the necessary preliminary work which had been arranged, but not actually commenced, at the time the project was shelved. The scheme will be restored in its entirety as framed by the Committee of Imperial Defense, but in view of the urgent necessity for national economy the early stages of the work will be carried out in a somewhat leisurely fashion. It is believed to be the intention of the Cabinet to allow the Admiralty to make their own proposals.

In any event the one fact that really matters is that Singapore is to become a first-class naval base. Unquestionably, the voice of Australia has proved a determining factor in the early decision of the government. But the strong case for the creation of this strategical "hub" really needs no external emphasis. The opposition to it has come from the Labor Government on the double plea of economy and disarmament. The foreign powers which are inferentially concerned in the scheme have shown no hostility whatever toward it. On the contrary, they realize that the possibility of a powerful British Fleet appearing in the Pacific at a juncture of political tension might well exercise a potent influence in the cause of peace. Manifestly, such a fleet could only appear if accommodation existed for its reception and replenishment. There is no suspicion of aggressive design in connection with the Singapore project; only the purpose of defending our trade routes and overseas dominions in the event of aggressive designs on the part of other nations.

Much has been written regarding the strategical aspects of the Singapore scheme, but the clearest and most comprehensive summary of the reasons for the undertaking that we have yet come across figures in the current number of the *Journal of the Royal United Services Institution* and is contributed by Captain R. J. Wilkinson, O.B.E., of the 2nd Bombay Pioneers. There is nothing anomalous in the circumstance that a soldier should prove such a sound authority upon this problem, since a mastery of strategic principles does not call for more than an elementary knowledge of tactical material. Captain Wilkinson draws one essential distinction between the lines of communication of a land force and a sea force. The former follow definite routes such as roads, railways, rivers, et cetera; they are more or less vulnerable along their whole length and, therefore,

need definite protection. The latter only become determinate where they converge upon defiles, such as the Straits of Gibraltar, the Suez Canal, and similar narrow waterways.

To realize this differentiation is very necessary to a correct appreciation of the problems of commerce protection. Land communications may be cut anywhere along their exposed length; sea communications only at their point, or points, of convergence. By virtue of this doctrine it may be argued that Centa could command the western entrance to the Mediterranean as well as Gibraltar, or Obok in French Somaliland the pass of the Red Sea as well as Aden; but by holding undisputed control of the routes leading to, and past, these places Great Britain maintains command of the defiles on one side of which her own fortifications sit. While it is often said that such and such a place commands such and such a defile, as Captain Wilkinson very truly points out, no place commands anything beyond the range of vision. It is axiomatic that no maritime fortress can be reduced by sea power alone. It must be turned from the landward side to compel submission. In proportion as an overseas naval base is easy or difficult of land attack, so may its strategical value largely be determined.

Applying these long-proven principles to Singapore, Captain Wilkinson arrives at the logical conclusion that the place has peculiar natural advantages for a great naval base. It is situated at the southern end of the Straits of Malacca. For some two hundred miles westward the average width of the Straits is less than twenty-five miles. Eastward it is studded with small islands, which would greatly facilitate submarine, mine and aerial defense. The consequence is that, so long as it continues to be effectively held and supplied, Singapore not only commands, but can effectually deny, the principal line of communication between the Pacific and the Indian Ocean. Its accessibility to Burma, India and even the Persian Gulf should render it always certain of maintaining essential supplies, naturally presupposing the existence of a sufficient naval force to prevent serious interference with the very wide zone of sea communications.

The island of Singapore is connected with the Malay peninsula by a causeway. The long, narrow strip of the Federated States is under British protection and could be broadly dominated by British naval guns. It consists largely of jungle country, presenting many difficulties to military operations. As there are no important land routes leading to it from potential enemy arsenals, a landing force which designed attacking Singapore from the north would have to be supplied by sea, and this would be possible only to an enemy which already held command of the sea. In its turn, command of the sea would obviate any necessity for a landward attack upon Singapore. Therefore, it may be reasonably concluded that the place is immune from such menace.

Another Big Program

Naval and Military Record, 24 December, 1924.—Evidently the Big Navy party in the United States, led by such reckless propagandists as William Shearer, are in the ascendancy. The Senate has now passed the new Naval Construction Bill, under which a sum of rather more than one hundred million dollars is forthwith to be devoted to new warship construction. It is believed that virtually the whole of this amount will be expended upon the building of very fast cruisers, of a tonnage and armament up to the full limits allowed by the Washington Agreement. As the United States has a substantial superiority over any other naval power in big, fast cruisers, the necessity for this step remains a matter for speculation. But then this applies to American naval policy generally.

It must be admitted that the prospects of the conference upon disarmament which has been arranged for June next at Geneva are not looking par-

ticularly roseate as the year of Ramsay MacDonald's "golden dreams" draws to a close. We do not, indeed, believe that anything in the nature of a revival in the race of armaments is probable. For one thing, the world cannot now afford it, and there is absolutely no justification for anything of the kind in the appeal to common sense, but that we are on the eve of greater activity in naval shipbuilding is pretty clear.

One rather wonders what President Coolidge has to say about the new United States Naval Construction Bill. His sincerity in the desire to see a further restriction of armaments is second only to that of Mr. MacDonald himself. One quaint plea for the present American policy is that, by the creation of overwhelming superiority, it will enable that country to dictate disarmament (on her own terms, of course) to the rest of the world. Such a suggestion shows a remarkable ignorance of international psychology. The Washington Agreement was only rendered possible by a spirit of "sweet reasonableness." It could never have been achieved by any attempt at coercion.

The disapproval—we had almost written the open resentment—which is being shown in Japan in consequence of the published scheme of the forthcoming United States' naval maneuvers is really not very difficult to understand. With Honolulu as a base, the American Pacific fleet is to carry out a strategical conception, the character of which is unmistakable. Japanese sea power can alone be the objective of the general idea revealed in the outline of the maneuvers. That a growing sense of dissatisfaction exists in the United States at the prohibition to develop Guam and Manila as first-class naval bases imposed by the Washington Agreement finds evidence in many direction. Under existent conditions Japan is more favorably situated for claiming naval dominance in the Pacific than is the United States.

In Tokio the forthcoming American fleet maneuvers are frankly regarded as implying that the United States has no intention that Japan should be under any illusion with regard to command of the Pacific. A mass protest meeting has been held in the Japanese capital, and a resolution passed demanding that America should abandon the maneuvers as being altogether in contravention of the spirit of the Washington Conference. From our experience of American international politics, and her inherent dislike of anything which savors of dictation, or even of suggestion, we may assume that this is about the last thing she will consent to do. Much more likely is it she will take the view that Japanese protest forms the strongest justification for carrying out the big war-like rehearsal in Hawaiian waters. While the affair is of no direct concern to this country, we cannot affect to disregard it. Incidents of this character exercise a powerful repercussion upon naval policy throughout the world.

Another aspect of the proposed United States naval maneuvers is created by the fact that the announcement of the scheme which these embody synchronized with the definite statement that the British Government intends to proceed with the construction of the Singapore base. That this is nothing more than a pure coincidence goes without saying, but in Japan the two events have been promptly associated as an illustration of a common policy. One of the principal newspapers refers to "the beginning of an Anglo-Saxon nutcracker principle." The metaphor is a trifle vague, for we have never heard America described as "Saxon" before—but that America is meant is self-evident.

This sort of mistrust is not altogether calculated to promote that good understanding upon which alone the future peace of the world can be assured. Singapore is no more designed to "nutcracker' Japan than to guard the approaches to the North Pole. It is a strategical project dictated by the necessity to maintain trade routes and to protect Australia in the event of war in the Pacific. For the thinly-veiled purpose which the United

States maneuvers are intended to demonstrate, it is not our business to answer. We repeat that it is unfortunate the two things should be taken in conjunction since they have no earthly connection. The Singapore scheme was decided upon at least three years ago, and met with no disapproval in Japan at the time. In this country there is no desire to apply the "nut-cracker principle" to a densely overpopulated nation which has reached the limits of self-containment, for in that way, more surely than any other, would lie the certainty of war.

Pacific Maneuvers

Army, Navy and Air Force Gazette, 13 December, 1924.—It is unfortunate that some feeling should have been aroused in Japan by the plans for the United States naval maneuvers in the spring. For these operations the scouting fleet, at present in the Atlantic, is to join up with the battle fleet, usually in the Pacific, and the combined forces are to leave San Pedro, California, for Hawaiian waters, where it is intended that exercises shall be carried out until the battle fleet leaves for its proposed visit to Australia, about July 1. This program is very much on the lines of those which have been carried out in other countries, including Japan. It is intended to solve some interesting problems, the importance of which from the defense standpoint, to the United States is obvious. That anybody should find fault with such a program seems quite uncalled for, yet a certain party in Japan professes to be greatly perturbed on account of it. The *Mainichi* newspaper declares that the purpose of the maneuvers doubtless is to study how to fight Japan, and that, if they are persisted in, war will be inevitable.

This is not the view taken in Australia, where the Japanese objection is resented as amounting to the assumption that Japan has a pre-emptive right to that ocean. "As well might France or Italy," declares the Sydney *Sun,* "object to British warships in the Mediterranean." The visit of the American ships is looked forward to in the Commonwealth, where the vessels are promised a warm welcome, such as has been given to Japanese and other squadrons in the past. The Pearl Harbor base, on the island of Oahu, in the Hawaiian group, is as necessary to the freedom of movement of the American fleet in the Pacific as the Singapore project is to the mobility of our own fleet in the East. Conflicting reports were in circulation last week regarding the intention of the new British Government toward Singapore, and although it is stated that the matter has not yet been discussed by the Cabinet, the policy of the party when in opposition stands on record, and it can only be a matter of time before the development of the base is resumed. Negotiations and understandings implied by the Labor Government's postponement have not materialized. The *Mainichi,* if we mistake not, which now opposes the actions of the American authorities, also opposed the British plan to extend the facilities at Singapore. The journal probably does not speak for those in authority, but it no doubt expresses the views of an influential section, and its articles reveal the need for other powers to make their position and intentions as clear as possible, in order to prevent further misunderstanding.

American Naval Efficiency

Army, Navy and Air Force Gazette, 20 December, 1924.—Last week-end there was a revelation made in Washington which indicates conclusively the satisfactory state of efficiency of the United States fleet. There can have been little doubt upon this matter in the minds of most British naval officers, but during recent months an agitation has been on foot, probably not unconnected with the electoral campaign, designed to disparage the condition of the existing fleet. Mr. Wilbur, the naval secretary, has not been above

supplying powder and shot for this campaign, and in a speech which was broadcast by wireless in October he described the United States Navy as "only eighty per cent as powerful as that of Great Britain." But there is now available the text of Mr. Wilbur's evidence in committee on the general subject of the state of the fleet and the ratio of strength established by the Washington Treaty. He has never had any doubt, it seems, that the ships retained by America under the treaty were substantially equal in fighting ability to those of Great Britain. "The fact is," he said, "we got exactly what we proposed," a declaration which disposes of the contention that the United States was out-maneuvered, and her fleet "eclipsed," at the conference. As with relative strength, so with individual efficiency. In spite of all the talk about impaired boilers in the older vessels," all the ships are in condition to fight tomorrow," says Mr. Wilbur, "and the *Florida* could with the limitations I have referred to."

For the next fiscal year the Naval Supply Bill, now before Congress, proposes an expenditure of about £58,000,000, as against the £55,800,000 voted for the British Navy this year. The bill authorizing the construction of eight cruisers has apparently been passed. In addition, the secretary recommends the construction of four more to be begun in the fiscal year 1927. Five fleet submarines, already authorized, one aircraft carrier and one floating dock, not yet authorized, are also recommended to be begun in the fiscal year 1926. From the fact that plans for the cruise to Australia are going forward, it would appear that no difficulty in regard to the necessary provision of oil fued is anticipated. The cruise begins about July 1, following the combined maneuvers off Hawaii of the battle and scouting fleets, the holding of which has caused a lot of rather foolish talk in Japan. Operations at sea of this character, followed by an extended cruise, will form the best evidence of the real condition of the American Navy, and if, as seems likely, the squadrons come through the test as well as did those which Colonel Theodore Roosevelt sent round the world in 1907-09, the pessimists will be entirely confounded.

FRANCE

French Expert Declares Rapid Developments In Submarines, Mines And Bombing Planes Mean End Of Construction Of Giant Dreadnaughts

By Captain Castex, of the French Navy, Baltimore *Sun*, 23 December, 1924.—Toulon, November 29.—In a recent article regarding battleships and aviation I touched briefly on the question of displacement of future warships, but limited myself to saying that it was to be hoped their tonnage would be diminished. Today I would like to express myself more fully on this point.

The most important naval fact of the moment, the first of the lessons taught by the last war and the one which will prove of the greatest tactical consequences in the future, assuredly is the great development of the submarine weapon—that is, of the means permitting an attack upon a warship from under the water, striking it in its vital parts. The future will only amplify the importance of this lesson.

The torpedo has made remarkable progress, both in the range at which it may be used and in the weight of the explosive it can carry. The larger vessels are now well equipped from this point of view. They can launch torpedoes which carry to a distance of 20,000 yards. It is no longer possible, as it once was, for ships to fight an engagement with guns alone while outside the range of torpedoes.

The importance of the big destroyers, those which accompany the fleets,

therefore, has been greatly increased. The fact that submarines are constantly increasing in perfection and in number makes it possible to use the torpedo under conditions impossible for other warships and converts it into a very serious menace. Now, too, airplanes are appearing armed with torpedoes; they can launch them with a swiftness and suddenness of action out of the question for destroyers, making it very difficult to avoid them, however easily they may be seen.

Again, the surface warship has another new enemy, the bombing airplane, and the recent American experiments have taught us that the bombs the most to be feared are not those which fall upon a warship's deck but those which explode under the water, against its side, in the manner of a torpedo.

The effect of mines is so well known that it is unnecessary to dwell upon them.

Through the existence of these new and multiple modes of warfare, all aimed at the hull of a vessel, and all of decisive effect, it follows that the warships of the future will be exposed to risks which, while perhaps not entirely new, at least will be more frequent. In the actual combat zone or elsewhere one must count constantly upon an unexpected attack of this form, either from a torpedo, a mine or a bomb. Attacks once exceptional will become commonplace.

I am not ignoring the fact that every country is studying these dangers and is hard at work improving its protection against under-water attack. In England, since the launching of the superdreadnaught *Hood*, they have adopted the system of bulges, which appears to give good results. In the United States the hulls of the newest warships are being strongly reinforced as a defense against torpedoes.

But, admitting that these processes assure a convenient form of protection today, it is not certain that the situation will be the same tomorrow with the constant progress in these forms of weapons. This is true all the more, because in warfare greater attention is directed to the attack than to the defense.

Finally, these solutions, if they do save a warship from destruction, if they do permit it to remain afloat, do not protect it from serious damage. In case of damage there is nothing to do but to tow the damaged vessel to a dry-dock for repairs. That means that it will be useless sometimes for a long period, with consequences which may be very serious in the conduct of the war and which are apt to be all the more serious if the damaged vessel be a large one. Even for a powerful navy a warship of 30,000 tons can be spared less easily than one of only 10,000 tons.

If, then, every torpedoed ship is not entirely lost, it is at least put out of service for a very long time. It may, therefore, be asked if the best means of averting serious consequences is not to limit to some extent the size of warships and to have for the same total tonnage more warships of less individual displacement.

It was, indeed, along these lines that we proceeded in the last war. In combating the German submarines we had recourse to a large number of patrol vessels, torpedo boats, trawlers, etc., of dimensions sufficiently reduced so that they had little to fear from torpedoes. We found this the best means of fighting the enemy. Certainly we should have had equally good results in reducing the losses of our merchant ships if they had been made only for cargoes of small size. We should have saved the Allied tonnage by breaking it up, by scattering it.

This observation, of course, applies not only to naval warfare, but to the other domains. In the presence of the armed forces of our epoch, which are characterized by a great power of destruction, the concentration of too many interests in one sole point must be avoided at all costs, lest we offer a

magnificent target for the enemy. On the contrary, we must separate these interests so that they will be less vulnerable, more difficult to attack and impossible of destruction at one single blow.

Big artillery in the last war rapidly reduced the fortresses constructed according to ancient conceptions, but its work became much more difficult when it was directed against ordinary trenches spread out over great areas. Aerial bombardments have remarkable effects against great cities, but are almost powerless against objects dispersed across the country. A Zeppelin is destroyed in an instant by artillery, while an airplane is very difficult to hit. Dense formations are mowed down by machine guns, while men strung out across a field can escape.

On land it was understood long before the last war that the progress of armaments made the "extended order" necessary. This truth is now general and we encounter it in sea warfare as regards the under-water risks coming from torpedoes, mines and bombs.

These new threats have had the effect of restraining us in a movement which, before the war, was carrying us toward the construction of enormous warships. I consider this very fortunate, because, with no other curb, we would have had no reason for checking our course in this direction. Before the war there was every advantage in building vessels of great size for excellent technical reasons well known in every country. The greater the size, the easier the engineering problem, and the greater results from the standpoint of financial expenditure, of material and personnel. But opposed to these arguments others now arise concerning the new and more numerous risks a warship faces in the course of its career, arguments which lead us to a solution more modest and more wise.

The fleets of the future, in my opinion, will be composed of vessels of smaller tonnage. They will lay stress upon the importance of gun power and defense against under-water attack. The gun is always the principal weapon. The last war has not dethroned it. The battleship will retain its importance on condition that it accommodate itself to the new development in naval warfare, and is less vulnerable to attack by reason of better protection and slightly smaller displacement.

Gun power will always decide the outcome of naval wars, but engagements will occur between warships very different from those of today, warships which were forced to undergo radical changes in type in order not to disappear.

The French High Naval Command

Engineering, 19 December, 1924.—A French decree, which cancels about ten previous laws and orders, has just been published in the *Journal Officiel*. It completely reorganizes the French naval command and contains some important provisions. The executive head of the French Navy is henceforward to be the *chef d'état major;* he is to hold the rank of vice admiral, and is, in the words of the decree, "to take charge of operations at sea, in conformity with the instructions of the Minister, and the general wishes of the government." Immediately subordinate to him are the commanders-in-chief of the Mediterranean and Atlantic squadrons, who command all the squadrons, patrols, fixed and mobile defenses within their commands. The Atlantic region is, evidently, considered to be more important than the other, doubtless owing to its long coast line, and the weakness of the naval forces which are stationed in it. The organization is, therefore, strengthened by a "commander-in-chief of the Atlantic coast line," who acts as an "inspector general of all naval forces intended for the defense of the coast." There is no analogous command in the Mediterranean area. These three commands exist both in peace and in war; but, on mobilization, special officers will be appointed to command all the patrol

forces in the Channel, the Atlantic and the Mediterranean. It might have been thought that these would have taken orders direct from the *rue Royale;* but they are directly subordinated to the commanders-in-chief of the Atlantic and Mediterranean squadrons. These arrangements complete the organization of the naval forces afloat. Under the old system, which was in force before the present decree was published, the coast line was divided into four coastal areas, called the maritime frontiers, placed under the charge of vice admirals with their headquarters at Dunkirk, Lorient, Marseilles and Algiers. These commands are now suppressed, and six maritime prefects take over the duties which were formerly assigned to the commanders of the maritime frontiers. Within his area, the maritime prefect has charge of all naval dockyards, and is, in addition, responsible for defending the shore line against a "floating, disembarking, or landed enemy." The coast of the prefectures is divided into sectors, and, in each, a naval officer takes command of the coast defense. These officers of sectors are, in their turn, commanded by a naval officer of flag rank to whom the maritime prefect delegates the executive command of the coast defense. The idea which dominates the entire system is evidently the one expressed in Monsieur Georges Boussenot's report, previously described in *Engineering*: the French Navy is not, in itself, strong enough to make armed landings impossible on the northern and western coasts, and a special, amphibious organization is necessary to meet the danger. The new decree also re-constitutes the *Conseil Supérieur de la Marine;* a consultative body which, though it has not got the constitutional position of the British Board of Admiralty, is none the less an important part of the French naval command. Henceforward, the *Conseil* is to be composed of: the Minister of the Marine, the *chef d'état major,* the commander-in-chief of the Atlantic and Mediterranean Squadrons, the commander-in-chief of the Atlantic coast line, and a vice admiral specially appointed by the Minister. The government and the naval executive are still free to disregard, or over-rule, advice given by the *Conseil;* but no decision can be taken with regard to naval programs, general organization, coast defense, the characteristics of units to be laid down, including airships and aeroplanes, battle tactics, or the extension or suppression of dockyards, unless this powerful naval committee has first been consulted.

French Naval Plans

Engineering, 5 December, 1924.—The French Naval Estimates for 1925, which have now been submitted to the Chamber of Deputies, amount to 1,300 million francs, or approximately 15,500,000*l.* It has been decided, we learn from an article in *The Times*, to carry out naval reconstruction in a period of twenty years, the provisions being based upon the Washington Agreements, which have now been ratified by the French Government. The cost of new construction in 1925 is estimated at 500 million francs, which it is anticipated will be the normal annual expenditure on new ships, including tenders, airplane carriers, floating workshops, et cetera, until the building of ships of the line is resumed in 1932 as arranged for in the general program of naval construction, the first part of which was authorized by the law of April 18, 1922. This program provides for a French high sea fleet of 178,000 tons of ships of the line; 360,000 tons of light surface vessels; 65,000 tons of submarines, or 90,000 tons of submarines for coastal defense are included, and about 150,000 tons of vessels for special purposes, such as oil carrying, mine laying, floating workshops, sea plane carrying, and the shipment of submarine supplies.

In the estimates that have been made, the serviceable life of ships of the line, sea plane carriers and special boats has been taken as twenty years, while seventeen years has been accepted as that for cruisers, fifteen years

for destroyers and twelve years for submarines. The estimated total cost of new construction over a period of twenty years amounts to about 118,500,000*l.* Some portion of the credits for 1925 is to be allocated for the reorganization of the shipbuilding yards, which during eight years of idleness have not been kept abreast of the advances made in naval construction. A great sum of money is also to be spent in increasing the pay of the personnel and providing improved conditions. This is essential in order that a steady improvement may be obtained in the number of volunteers. The report calls attention to the urgent need for improvements in the air arm of the French Navy and also for the provision of liquid fuel storage.

Naval Program

The Engineer, 19 December, 1924.—The new naval program, providing for a complete reorganization of the navy on a definite basis, has now been completed, and will shortly be introduced into the Chamber of Deputies. When the first installment of naval construction was put in hand, the general lines of the Naval Statute, as it is called, were already laid down, and it has since been elaborated with a view of ensuring the rapid and economical construction of vessels which will constitute a homogeneous and efficient fleet. As nothing is said about the construction of capital ships, it is probable that the preferences of a large section of naval opinion have been set aside in deference to the generally accepted idea that the special requirements of France can only be met chiefly by fast cruisers and submarines. The Minister of the Marine has referred especially to the importance which will be given to under-water craft. It is hoped to make them sufficiently powerful to combat enemy cruisers, and, with the cooperation of seaplanes, to ensure communication between France and North Africa.

GERMANY

New German Warship

Naval and Military Record, 24 December, 1924.—On January 7 next the first warship to be added to the German Navy since the Armistice is to be launched at Wilhelmshaven. She is a light cruiser of 6,000 tons. Beyond this no details regarding her have been made public. Undoubtedly, the British Naval Intelligence Department is in possession of full knowledge concerning her, since she will have been built under the observation of the recently-disbanded Inter-Allied Commission on Disarmament. Her displacement does not suggest that she can have anything like the equivalent fighting value of the latest cruisers, either built or building, of the great naval powers, but mere figures are apt to be misleading as an index to relative qualities. In the early stages of the war we discovered that the 4-inch Krupp guns with which the little German light cruisers were armed were greatly superior in high velocity and range to our own 4.7-inch weapons, and in all but the greater smashing power of the projectile, were as effective as our 6-inch guns.

Just as we learned a very great deal from the experiences of the Great War, so we may be pretty sure did the Germans find their lessons, too. It would be extremely interesting to know to what degree the results of these are embodied in the design of their first post-war ship? If we may venture to speculate upon our knowledge of the salient principles which governed German naval architecture in the past, we should say that the chief asset of this new cruiser is likely to be an exceptionally high speed.

The strategical conditions under which the fatherland must always carry on war by sea are such as to render great mobility of vital importance. In this respect the Germans got a very high value out of a comparatively

small displacement. They are great believers in torpedo warfare, and it is probable that what their new vessel may lack in weight of artillery, as compared with corresponding units in other navies, she makes up for in the number of her submerged tubes.

JAPAN

Japan's Naval Policy

By Herbert Russell, *Naval and Military Record*, 24 December, 1924.—A statement recently appeared in the press, no doubt with the sanction of official authority, to the effect that the Japanese Government were curtailing their naval and military expenditure during the present year. Relatively, a much larger saving is being effected upon the army than upon the navy. The announcement was limited to the gross totals which are to be retrenched. No details were published as to the specific character of the economies, but I venture to doubt whether, however anxious they may be to reduce expenditure, the Japanese naval authorities will sanction any appreciable modification of the very extensive program of new warship construction to which they stand committed under the last Navy Estimates. In broad figures that program is about twice the size of our own for the corresponding period.

That a very definite policy lies behind the great activity of the naval shipyards of Japan is too obvious to question, but what is by no means obvious is the real nature of that policy. We can fit one or two very probable explanations to it, but these still leave a wide vista of speculation. The Japanese delegates at the Geneva Conference were perfect models of propriety—and inscrutability. They agreed blandly with the general doctrines of the conference. Only when any question arose which appeared to have a direct application to their own definite orientation were they politely non-acquiescent. Just as at the Washington Conference Japan gained more than she conceded (if only in the condition imposed upon the United States of not developing Guam nor the Phillipines, which virtually means leaving the Pacific undefended), so, I think, will it be found when it comes to that careful scrutiny of the Geneva commitments which Stanley Baldwin demands, that Japan emerges from it pretty well, from the Japanese point of view. True, from that point of view there is one rather large fly in the ointment. The United States was not represented at Geneva at all; she has committed herself to nothing.

In a general way it is pretty well understood in this country that Japan aspires to economic dominance in China. But what is not at all generally realized is how thorough, and exclusive, she hopes to make that control. The prospect is one which offers an alluring solution to the great problem now confronting that over-populated country, and which must steadily grow in intensity until it reaches a point at which decision must be forced. The integrity of China is one of the very few international questions upon which the Western Powers are in agreement, but in Europe that agreement is of a somewhat passive character. It is overshadowed by various great questions of more pressing moment. The result is that we do not hear a very great deal about it, since there is no apparent reason why the matter should claim serious attention.

In the United States, however, the question has assumed accentuated importance. America is concerning herself just as little as she conveniently can about the troubles of Europe. She therefore has a clear vision for her own special interests. It is not a question of trying to keep Japan out of China. That, the United States recognizes, is as impossible as it would be unreasonable. Rather is it a question of resisting the Japanese purpose of keeping the United States out of China. The Western Powers are still

obsessed with the terrible confusion left by the Great War. As a consequence perspective remains somewhat distorted. The United States has no such preoccupation. She is concentrating upon how to maintain and increase her prosperity by broadening the world's markets for her goods. It is strictly in this light that she views China. There is not one atom of sentiment in her concern for the preservation of the integrity of China. The integrity of a great American market is all she troubles about.

Here, then, we have the background against which stands out the Japanese naval program with some clarity of purpose. That Japan has been perfectly loyal as a signatory to the Washington Agreement is beyond doubt. She held out for, and finally gained, permission to retain the *Mutsu*, and so she is better off by a 33,000-ton dreadnought, of the very latest type, than the Washington Conference originally proposed. But when I was in Kure Dockyard rather more than two years ago, I saw hulls on the stocks, and guns, and armored plates, all chalked with the same monotonous message, which the Naval commander who accompanied me explained meant "Scrapped under the Washington Treaty." I admit that the chalkmarks were as far as the scrapping appeared to have got, but, as I say, that was more than two years ago.

But sauce for the goose is likewise sauce for the gander, and if the Washington pact has reduced Japanese capital-ship strength, it has correspondingly restricted American capital-ship strength. The point of real significance, which I would emphasize, is that the Washington pact has not restricted Japanese warship construction. At the present time she has, in various stages of building, practically double the tonnage of any other great sea power, and, since she is able to do this in perfect conformity with the terms of the Washington Agreement, the fact forms a pretty conclusive commentary upon the value of that international undertaking to limit armaments.

Strategically, of course, the Washington Agreement is all in favor of Japanese naval policy. It leaves her quite free to build unlimited numbers of the very type of warcraft most likely to prove best adapted to her plans. Even were she at unfettered liberty to lay down capital ships, it is very improbable that she would do so. Her sphere of action—presuming that it ever comes to action—will lie pretty near to home, and what we formerly called "mosquito warfare" will be her principal tactical scheme. If the United States should ever contemplate attempting to dispute her designs in China, she will have to send a fleet right across the Pacific. Japan's first obvious move—and a pretty easy one—would be to seize Guam and the Phillipines. Whether she could hold them indefinitely is another matter, but the immediate effect of this action would be to deny to the United States capital fleet any base for which to make.

In order to gauge the resources of a country for entering upon and maintaining a great naval war we must not limit survey to her present position, nor to what she is currently doing under international restrictions. The real crucial question is, what can she do when once she has shot her bolt? The fact that at the present moment Japan has twice as much warship tonnage upon the stocks as any other first-rate naval power sets no standard of capacity. It simply means that the other great powers are doing infinitely less than their normal limit; it may also mean that Japan herself is not doing up to her normal limit.

I am indebted to that very illuminating book, *Sea Power in the Pacific*, by Hector C. Bywater, for some striking data upon this point. He admits that it is incomplete, since it is only brought down to 1920, at which time important devolopments were still in progress. In that year, Admiral Kato, Minister of Marine, announced that "all the warships under construction would be built by none but Japanese labor and Japanese material." This

latter statement is particularly significant, since it has always been believed that Japan would be severely handicapped in the event of war by her natural poverty in the way of mineral resources. Apparently she has solved the problem of how to turn her great deposits of iron oxide to practical account.

Mr. Bywater computes that in 1922 Japan would possess government and private shipyards on the following scale: Able to build dreadnoughts, nine; light cruisers, seven; destroyers, twelve; submarines, ten. This certainly seems to justify the claim of the Japanese naval authorities that, in case of necessity, the yards of the empire could turn out four capital ships a year. That they can build rapidly we already know. The Kawasaki Yard, at Kobe, completed the 31,300-ton battleship *Ise* within thirty-one months from the date of laying her keel-plate. This same establishment holds what is probably a world record for swiftness of construction. A steamer of 5,800 tons, named the *Raifuku Maru,* was laid down on October 7, 1918. She was launched on October 30, and successfully completed her official trials on November 5. Twenty-nine days, from start to finish, for the production of a steamship of these dimensions is a feat which amounts to a very important asset in the category of resource.

The really interesting—indeed, I had almost written critical—period will come in June of next year, when, according to present plan, the League of Nations calls the signatories to the Geneva Protocol (of which Japan is one) to a conference on disarmament. What will be her attitude? On the face of it this seems likely to be determined chiefly by the attitude of the United States. This, in its turn, remains highly speculative. Beyond periodically expressing a keen desire to see the adoption of a further general policy of disarmament, America shows no active sign of endeavoring to further such a result. She held studiously aloof from Geneva, and will have nothing whatever to do with the League of Nations. How such a contradictory line of action is going to lead to definite attainment I confess I cannot see. Maybe she mistrusts Japan, but prefers not openly to say so. Certain it is that, under such conditions, Japan is not going to trust her. Meanwhile the big Japanese program of new naval construction is steadily materializing, and the "big stick" party in the United States, which is a very large and politically powerful party, goes on clamoring for a "100 per cent navy." We must wait and see, but meanwhile it is our business to keep the dampness of confiding idealism away from our own powder.

English Writer Thinks Japanese Press Attacks May Be Linked With Naval Expansion Plans—He Replies To Dr. Latane

By Hector C. Bywater, Baltimore *Sun,* 3 January, 1925.—London, December 11.—There is no reason to take a tragic view of the agitation which certain Japanese newspapers are conducting against the proposed American fleet maneuvers in the Pacific. These editorial fulminations are a little overdone. When the Osaka *Mainichi* speaks of war becoming inevitable if the United States fleet carries out tactical exercises in Hawaiian waters it is talking arrant nonsense, and knows it. One would assume from the tone of this journal that no foreign power had any right to send a warship into the Pacific without first asking leave of Japan. But the Pacific is a very considerable expanse of water, and Japan is not the only country with weighty interests there. If the *Mainichi* were an official organ, its comment on this subject would indicate a degree of arrogance to which the most swollen-headed Prussian warlord never attained. It is not an official organ, however, though like all other Japanese papers it is amenable to official "guidance" and inspiration.

Let us consider the main facts of the case. It is proposed next year to

stage the annual naval maneuvers in a zone which is strategically important solely from the defensive viewpoint. So far as they have an object beyond giving the fleet an opportunity to practice teamwork, they are designed to test the resources of Hawaii as a war station. It is, of course, well known that as a naval port Pearl Harbor is still in a backward state of development. Its present facilities are wholly inadequate for the requirements of a big fleet mobilized for war; but to what extent they are inadequate has never yet been determined, though precise knowledge on this point is indispensable to the framing of plans for the defense of American territories in the Pacific. It would not suffice merely to make a list of the docks, stores and magazines already available and calculate therefrom the size of the fleet which could be mgaintained under war conditions. Paper estimates of this kind are invariably misleading.

No secret has been made of the purpose underlying the maneuvers. Admiral Eberle, the naval operations chief, has been perfectly frank about it. And why should not he be? If there were no Washington Treaty, and if the impending exercises were to be held from Manila or Guam, the Japanese might have grounds for regarding them with apprehension. But the strongest fleet working from Hawaii could not possibly, under present conditions, represent a danger to Japan. From Pearl Harbor to the nearest Japanese coast is a distance of 3,400 miles, nor is there any intermediate station at which a hostile American fleet could call for supplies if it voyaged across the Pacific.

Even in peace the round trip of 6,800 miles would impose a strain on the fuel endurance of American battleships. In war the fleet could not accomplish more than one half the distance. So that, no matter how many ships the United States may concentrate at Hawaii, Japan can look on without misgiving, knowing full well that her coasts lie beyond range of attack. Even the *Mainichi* inferentially admits as much, since in order to bolster up its alarmist policy it has to drag in a cock-and-bull story about the American fleet subsequently proceeding to Australia and New Zealand "to make them participate in the second phase of the maneuvers." For sheer perversity this would be hard to beat.

The rabid language of Japanese newspapers could be ignored if it were clear that nothing more serious than one of their periodical outbursts of anti-Americanism was at the bottom of it. There may, however, be a method in their madness. The Japanese Government is believed to be meditating a further increase in naval armament, and while it would be unfair to charge them with any direct part in the press campaign now raging, their plans could scarcely have received more opportune support.

The "bellicose spirit" of America, always a safe card when naval expansion is in view, has been played more than once in the past. Japanese naval experts now argue that the programs of auxiliary construction taking shape in Europe and projected in the United States tend to overthrow the standard of relative strength which Japan herself is building to maintain. When introducing the revised scheme of construction after the Washington Conference the late Admiral Baron Kato was careful to insist that the new tonnage would suffice only so long as the fleets of other powers remained stationary. Since then, however, both Britain and France have laid down a number of new ships, and the United States plans to build eight cruisers.

It is all but certain that Japan would have enlarged her own program before now but for the catastrophic earthquake and the financial stringency resulting therefrom. William Howard Gardiner, vice-president of the United States Navy League, who has excellent sources of information, states that a supplementary Japanese building scheme introduced in August, 1923, but presumably suspended on account of the earthquake, provided for 100,000 tons of new cruisers and 53,000 tons of submarines. This would

have been equivalent to adding ten cruisers of the largest type and fifty or sixty ocean-going submarines to the present fleet.

In the ordinary course of events the Japanese Parliament would certainly reject such a scheme, burdened as the country is with the heavy cost of earthquake reconstruction, but it would help matters considerably if the people could be persuaded that the United States was on the warpath.

Reverting to the Hawaiian naval maneuvers, it seems that opposition to the plan is not confined to Japan. The remarks of Dr. John H. Latane, of Johns Hopkins University, quoted in *The Sun* of November 20 and 21, deserve a respectful hearing, for they evidently reflect the views of many thoughtful American lovers of peace. Dr. Latane's objections to the plan are crystallized in the following sentence: "I regard the proposed naval maneuvers in the Pacific as unfortunate because nations whose policies conflict and whose relations are strained cannot be continually thinking war and playing at war without endangering peace seriously." As a general proposition this is unanswerable. There is no doubt whatever that the intense naval rivalry between Great Britain and Germany created a psychological atmosphere conducive to thoughts of war, and so paved the way for the dread reality.

Nevertheless, the analogy between the North Sea situation in 1914 and the Pacific situation of today is not close enough to warrant alarm. In the former case two great navies faced each other across a strip of water a few hundred miles wide and both were still in process of feverish development. In these circumstances war had become inevitable, humanly speaking, and was only a question of time. But, although we now see two fleets facing each other across the Pacific, they are thousands of miles apart, and the physical obstacles are such that, as many onlookers believe, they could never meet in battle. Moreover, such rivalry as exists between them is one-sided. Japan, it is true, goes on building steadily, but there is no corresponding reaction in the United States.

Finally, the United States naval viewpoint deserves some consideration. War with Japan may or may not be probable, but it remains a possibility, and if war did come the American nation would expect its navy to be prepared. A great responsibility is thus placed on the navy chiefs. Since they are charged with the country's defense, they ought to be allowed a reasonably free hand in taking such measures as they deem essential for the fulfillment of that onerous duty.

The proposed maneuvers off Hawaii are intended to solve vital problems of logistics—and logistics dominate all modern sea strategy. If war broke out before those problems had been solved, the Navy would fight at a terrible disadvantage; and if things went wrong, as probably they would do, the Navy and its leaders would get all the blame, for a public, smarting under defeat and humiliation, is apt to be undiscriminating in its wrath.

There is absolutely no reason why Japanese-American relations should suffer in consequence of the forthcoming maneuvers. If they do suffer, it can only be because Japan desires such a result. All unprejudiced critics agree that the extension of Britain's naval base at Singapore implies no menace to Japan, yet Japan could be reached more quickly from Singapore than from Hawaii. One must repeat, therefore, that the Japanese agitation against the maneuvers is artificial and entirely uncalled for.

UNITED STATES

5-5-3 Ratio, Wilbur Says, Does Not Mean Navy Equals British

Washington *Post*, 9 January, 1925.—Secretary of the Navy Wilbur yesterday morning appeared before the House naval affairs committee and was subjected to a searching cross-examination as to certain vitally im-

portant features of the naval establishment. He answered questions freely and frankly, excepting in some instances where he described information desired as confidential.

There was no effort by the committeemen to embarrass Mr. Wilbur or to play politics, but the information divulged by the Secretry was at times so important it may give the people of the country entirely new and unwelcome conception as to what the state of the American Navy really is and how it compares, under the 5-5-3 ratio, with navies of foreign powers, notably that of Great Britain.

These salient features stand out from the Secretary's testimony:

First—The 5-5-3 ratio does not mean that the American Navy is the equal of the British, even in capital ships, in so far as fighting efficiency or battle strength is concerned.

Second—The American Navy is inferior to the British in tonnage, in speed and in gun range, and the 5-5 classification of equality, under the Washington Treaty, was described by Mr. Wilbur as merely a sort of yardstick of measurement on a basis of tonnage. He declined to say the American Navy could be regarded as the equal of the British in fighting strength, even with respect to capital ships.

Third—Elevation of guns on American battleships would do much to offset the relative inferiority of the American fleet but, in response to British protests, Secretary of State Hughes has taken the position that such elevation, although not in conflict with the treaty, would tend to stimulate competition and should, therefore, be removed from consideration.

Fourth—Coincident with the British protest it developed that three of the five powers which signed the Washington Treaty, Japan, France and Italy, have elevated their guns and therefore increased their range for armaments by the very method which the State Department says the United States should not follow.

As soon as the hearing developed in earnest there was an unmistakable impression that America has been handicapped as a result of the aftermath of the Washington Conference and, furthermore, that the American people have been lulled into a mistaken impression as to the relative strength of the United States and British Navies. There was shown, too, a tendency on the part of certain sources to keep the American people tranquilly reposing in an optimistic state of security as to the navy because the information that Japan, France and Italy had raised their guns was described as "confidential," and because the fact that the 5-5-3 ratio did not really mean equality in fighting strength with the British was only reluctantly exposed.

One result of these exposures, however, probably will be a determined effort on the part of Congress to suggest the executive branch of the government reconsider its attitude with respect to the raising of guns on American battleships. It is doubtful if this move will be made seriously at this session, but a marked impression was left on several members of the committee that this elevation of guns provided at least a partial remedy toward putting American naval strength on a footing where it would approach the strength of Great Britain and keep its proper ratio with Japan.

It was due largely to the efforts of Representative A. Piatt Andrew, Republican, of Massachusetts, that the cold, hard facts with respect to America's relative naval strength were brought to light in such shape as to be easily understood and appreciated. Secretary Wilbur had pointed out that repairs on the battleships *Arkansas, Wyoming, Utah* and *Florida* had been necessary and that such repairs had been virtually completed excepting in the case of the *Florida.*

"With these ships repaired, the 5-5-3 ratio will be restored as to capital ships," Mr. Wilbur stated. He added that it would take two years with an

appropriation of $11,000,000 each year to complete the work and he said that added deck protection and blisters would increase tonnage. Shortly after this, Mr. Andrew began a series of questions designed to get at the real meaning of the 5-5-3 ratio, especially with relation to the real comparative efficiency of the British and American Navies. The 5-3 figures implied equality of naval strength and Mr. Andrew questioned Secretary Wilbur as to how any such conclusion could be arrived at.

Was the American fleet not inferior by about 2 knots in speed as compared to the British fleet? Mr. Andrew asked, and Mr. Wilbur admitted it was inferior in speed.

Is the American fleet composed of the nation's capital ships inferior in range of guns? Mr. Wilbur admitted that thirteen of America's eighteen capital ships would be inferior in this respect. And was not the American fleet inferior in tonnage? Again it was admitted this was the case.

After establishing these facts Mr. Andrew wanted to know how it was possible for the American Navy to be inferior in tonnage, inferior in speed and inferior in gun range and yet be the equal of the British fleet. In case of an engagement, he pointed out, we would be unable to fire and could only receive shots, without being able ourselves to hit, he added.

In reply Secretary Wilbur said that the only practical measure of comparison was found to be tonnage.

"We have deliberately designed our ships to be slower than the British," he said. In expanding this idea, the Secretary said, the British sacrificed armament and armor to speed and that American naval architects had thought it wiser to sacrifice speed.

But Mr. Andrew demonstrated that America's sacrifice in speed had not been compensated for by strength of armament or range of guns, because America was not only inferior in speed but also in gun range. The great importance of increasing America's gun range by elevating battleship guns was therefore again thrust to the fore, but Secretary Wilbur simply said:

"I think we must divorce the elevation of guns from the 5-5-3 ratio."

The Secretary then volunteered the information that eight of the British capital ships have a speed of only 21 knots.

"Yes, but that is eight out of twenty-two and it leaves fourteen with greater speed than the American capital ships," Mr. Andrews replied.

At this juncture Representative Britten of Illinois asked: "With the British ships faster than ours and with their gun range greater, would you say that our eighteen ships are equal to the British twenty-two in actual battle?"

"I haven't said that and I don't know that I want to answer that," Mr. Wilbur replied. He then went on to say that when we speak of the 5-5-3 ratio we speak only of "a particular method of measurement." It was clear to all by this time that the Secretary did not contend the 5-5 ratio, as between British and American naval strength, actually meant America's strength was equal to the British. This unwelcome fact seemed as a distinct surprise to some members of the committee as it is expected to be to the American people.

Mr. Britten, referring to a communication from the Navy Department, said:

"There is a bill pending before the committee for the elevation of those guns. The bill was sent to your department for recommendation and you replied that it was not compatible with the President's financial program. But you do feel that the elevation of those guns is very vital to the condition of the fleet?"

"It would have been a great advantage," Secretary Wilbur replied.

"The actual expenditure involved is only $6,500,000," interposed Mr. Andrew, who wanted to know how such a small item could be viewed as a prodigious expense.

The testimony of Secretary Wilbur then digressed, in response to inquiry, along the lines of the Navy's airplane program, but Representative Patterson, of New Jersey, reverted to the important ratio question. He wanted to know whether, after all repairs on American ships had been made and all moderations completed, the American Navy "would be the equal of any other country, so far as capital ships are concerned."

"I think I'll ask you to let that matter rest where it is," the Secretary replied.

Interspersed in the testimony about the 5-5-3 ratio were interesting discussions as to the relationship of aircraft to the Navy. It developed that Secretary Wilbur has asked the General Board to make a full report on this subject and that this report will be given to the President in a few days and later made public.

In view of the fact that the board is about to make its report, Secretary Wilbur declined to be drawn into discussion of the effect of bombs dropped from airplanes on battleships, or the feasibility of equipping airships of the *Shenandoah* or *Los Angeles* types to act as airplane carriers. He did say, however, that these airships had not yet proved their value to the Navy.

The fact that Secretary Wilbur had asked for an appropriation of only $16,000,000 for the air service in the last naval bill seemed to interest Representative Britten and others. It developed that Rear Admiral Moffett had asked for $32,000,000 but that the budget bureau had cut down all expenditures.

Before the hearing began, Representative Butler, Republican, of Pennsylvania, chairman of the committee, read the letter from Secretary Hughes explaining that the British Government had taken the position that it would be a violation of the treaty for the United States to raise the guns on American battleships. Mr. Hughes took the position that no treaty violation was involved but added that to elevate the guns would tend to bring competition in armament which the United States Government desired to avoid.

President Puts Foot Down On Gun Elevation

Baltimore *Sun*, 10 January, 1925.—Washington, January 9.—Not only is President Coolidge opposed to legislation for the elevation of guns on American capital ships, but if the money for such elevation is provided, notwithstanding, it is morally certain that he will direct the Navy Department not to spend it.

The Executive is firmly convinced that any move by this government to strengthen its sea power by increasing the range of the main batteries of its battleships is sure to excite the apprehension of other naval nations and to renew the armament competition which was measurably halted at the Washington Conference. All this was made forcibly clear at the White House today.

It was declared that the position of the President upon this issue had never changed; that he had felt all along that it would be a mistake to change the gun elevation, and that he is perhaps more convinced than ever that it would be a mistake.

Also, it was announced that the President had transmitted to the Senate Naval Affairs Committee the letter from Secretary of State Hughes, which had earlier been sent to the House Committee and which had set forth the objections of the British to the proposed reconstruction of American capital ships.

Mr. Coolidge, it can be stated, does not question the right of this government to alter the batteries of its battleships. That right, he believes to exist, under the terms of the five-power naval treaty, just as Secretary Hughes has pointed out at length.

But the Executive contends that it would be bad policy to provoke any naval power to re-engage in armament competition and to create ill will and distrust on the part of any such power when there is no sound reason for such a course.

It is known to be the White House view that the American battleship fleet is at no serious disadvantage after all in its fighting strength; that only eight of the battleships have a shorter range than corresponding ships of the British Navy while another group of American men-of-war actually outrange any similar ships in the British fleet.

According to the emphatic White House comment today, however, it is not so much a matter of relative fighting strength of the two fleets as it is a question of breaking down the spirit of the disarmament conference by a resort to further naval competition.

Looking at the question from a purely practical standpoint, the White House pointed out today that the Washington Agreement had but ten years to run, that nearly three years already have elapsed and that it would be nearer two years than one before the gun elevation might be brought about, if the money should be made available.

The President's idea is that it, in all probability, would be an utter waste of money to spend eight or nine million dollars on a group of battleships that may be practically obsolete by the time the Washington disarmament treaty expires.

All of which convinces those who have heard the President discuss the matter that he will decline to permit the Navy to use any money which Congress may appropriate to elevate the guns of battleships. If the act appropriating the money should be mandatory, this might not be so easy, but if the funds are merely authorized, Mr. Coolidge could act at his own discretion.

It is recalled that three years ago Congress, after a campaign on the part of naval officers, provided $8,000,000 with which to change the elevation of the guns on eight battleships. This was done upon the strength of official information from England that the British had so increased the range of their guns.

When the British formally protested to this government that they had made no such changes in construction, assurances which recently have been reiterated, President Harding held up any expenditure of the money, and the fund which had been provided reverted to the general fund of the treasury.

The British, as Secretary Hughes points out in his communication to Congress, contend that gun elevation would be a distinct violation of the reconstruction section of the treaty. With this view the American Government differs, as a matter of interpretation, as does the Japanese Government. Mr. Coolidge puts all that aside, resting his policy in the matter upon the broader phase of the situation, particularly upon the misfortune, as he sees it, of any move that would incite other naval powers to engage again in naval competition.

That the gun-elevation proposal will be abandoned so far as this session of Congress is concerned is indicated by statements today of Representatives Britten, Republican, of Illinois, and McClintic, Democrat, Oklahoma, strong advocates of battleship reconstruction, that they will wait until next year to press their measures.

"I shall reintroduce and press my demand for the elevation of guns on battleships at the next session," said Mr. Britten. "Public sentiment for rehabilitation by that time, I believe, will force legislation. I am satisfied with the development of the facts by the Secretary of the Navy. They show the weakness of our naval defense and how far the Navy has been permitted to fall short of the treaty strength."

Expressing his view, Mr. McClintic said that "it is all over for the present. The question of bringing our Navy up to its full authorized strength is laid aside until the next session, at which time I shall press for a more enlightened development of the naval air force and require that the science of aviation be taught at the Naval Academy," he added.

Enormous Dirigibles Urged By Naval Expert

Baltimore *Sun*, 10 January, 1925.—Washington, January 9.—The possibility of airships "compared to which the *Shenandoah* would be a baby" mothering six or eight airplanes within their hulls, mounting twenty machine guns and three-inch pieces and capable of scouring the Atlantic and Pacific at eighty or ninety miles an hour to warn against the approach of hostile fleets, was described today before the House aircraft investigating committee by Starr Truscott, civilian expert of the Navy Department.

Air cruisers of this type could accomplish as much as six scout cruisers in keeping the Navy informed of movement of enemy battleships, Truscott said, adding that similar commercial dirigibles could be reconditioned for military use within two days. The United States, he urged, should develop a fleet of three to six such airships.

Conservation of helium resources, he added, was a "vital necessity," since the non-inflammable gas gives the United States an "overwhelming advantage" in national defense because no other country is able to produce it.

Navy Up To Par, Coolidge Believes

By Frederic William Wile, Washington *Star*, 10 January, 1925.—Several years before the World War the late Lord Fisher, one of the creators of the modern British Navy, said on a famous occasion: "John Bull can sleep peacefully in his bed at night." Fisher was referring to the clamor in the British press and public for a huge new battleship program to meet German competition.

Some such message as Fisher uttered is the one that Calvin Coolidge would now send to the American people: "Uncle Sam can sleep peacefully in his bed at night." What the President would have in mind is the agitation now raging in Congress for naval appropriations sufficient to match the greater gun range and higher speed of the British Navy and the superiority in light cruisers and some other craft which, it appears, Japan enjoys over the United States.

The American Navy, in President Coolidge's estimation, is all right. The United States is perfectly safe at sea. It is not safe from the standpoint of those who would like to use the United States fleet for aggressive war, but from the viewpoint of those who believe the Navy's primary and exclusive duty is to remain "our sure shield"—that is, an impregnable defense—the American Navy is unquestionably sound and adequate. It needs rounding out at vital spots.

Half a dozen of our treaty battleships need to be fitted with new boilers and "blisters" for protection of decks and hulls against air and torpedo attack. We need to build the eight 10,000-ton light cruisers which have been authorized, but not yet appropriated for. We shall not be up to the ratio in aircraft carriers until the converted battle cruisers *Lexington* and *Saratoga* go into commission, as far as Great Britain and Japan are concerned. In destroyers we are still ahead of the treaty ratio allotted us and, therefore, superior to both Great Britain and Japan. In submarines, at least numerically, we are ahead of the ratio. In naval aviation in general, exclusive of aircraft carriers, we are well above the ratio.

The broad purpose behind the American plan for the Washington

naval treaty was to make aggressive war impossible at sea. When Secretary Hughes had his preliminary conferences here with Lord Balfour, the chief of the British delegation, and Admiral Baron Kato, the leader of the Japanese delegation, and with their respective naval advisers, it was speedily determined that the basic objective—banishment of an aggressive naval war—could be practically achieved by limiting capital ship tonnage.

Secretary Hughes, supported by the British, left no stone unturned as the conference progressed to effect limitation of other than capital ship tonnage. That hope was wrecked mainly by the opposition of France. It left all the naval powers at complete liberty to build as many light cruisers, destroyers, submarines and naval airplanes as they cared to afford.

Yet, notwithstanding this deplorable temptation to renewed naval competition, America, Great Britain and Japan left the conference when it was over, convinced that the big, principal purpose was realized. They were confident it had become impossible for either Great Britain or Japan to make war on the United States across, respectively, the Atlantic or the Pacific. They were equally certain it was now impossible for the United States to cross those oceans to attack the British Isles or the island empire of Japan.

This outstanding factor—national security—being guaranteed by the Washington Treaty, as the Coolidge administration sees it, the President is unalterably opposed to anything which could be interpreted as a sign of American desire to renew naval competition. That is why, even though we have the right under the treaty to elevate our battleship guns, Mr. Coolidge will not take advantage of the privilege. He does not believe it necessary from the standpoint of national defense. He believes it would be, therefore, an improper expenditure of money, but he is actuated, above all, by a determination that America shall not lead the way in nibbling the limitation treaty to pieces. At the White House no doubt is left as to the President's belief that gun elevation would be planting beneath the treaty the first of a vicious circle of explosives that eventually would wreck the pact. The consequence, in Mr. Coolidge's belief, would be the eventual breakdown of the sentiment which brought forth the Washington Conference. His passionate desire is not only to preserve what he thinks is the country's strong sentiment in favor of naval limitation, but to develop it.

It is because the President considers that another conference, which will take up and carry on where the Washington Conference left off, is attainable that he stubbornly opposes anything that would jeopardize the prospects of bringing it about.

Issue Believed Dead

Washington *Star*, 10 January, 1925.—Proposals in Congress for elevation of turret guns on American capital ships were regarded by most of official Washington today as being practically dead, in view of President Coolidge's positive stand against such alterations.

Senate and House naval committees have been withholding action on gun elevation proposals for some time with indications that no attempt would be made to press them if administration opposition should be made known. The President's position, based on the opinion that elevation of the guns would reverse the policy effected by the Washington arms limitation conference and bring about resumption of international competition in armaments, was made unmistakably clear yesterday at the White House.

The technical right of the United States to elevate the guns and the question of costs the work would entail are looked upon by the President as minor considerations in comparison with the question of reverting to armament competition. He hopes to strengthen the policy of non-competition as enunciated in the arms limitation treaty, which he feels has

the support of public opinion, and intends to combat with all his power agitation designed to change that opinion.

Emphasizing the White House declaration against gun elevation, the President responded to a Senate resolution inquiring about protests from other nations against the proposal by transmitting a copy of the letter Secretary Hughes sent to the House naval committee Thursday, setting forth that Great Britain had made known its opinion that such alterations would violate the arms limitation treaty, while Japan and the United States were in agreement that they were permissible.

The New Fighting Ship

Washington *Post*, 15 January, 1925.—Secretary Wilbur hit the bull's-eye when he described the 5-5-3 ratio of capital ships as a mere "tonnage yardstick," with little relation to the actual fighting strength of the fleets concerned. Tonnage alone means nothing when estimating the fighting strength of fleets. The factors of speed, radius, gun range, protection against torpedo and air bombs, auxiliaries, and naval bases must be considered in estimating naval forces. It must be remembered, also that no navy is standing still. It is either improving or falling back.

The remarkable design for the two new British battleships *Nelson* and *Rodney* emphasizes these facts. The British government has a right under the naval treaty to build these two capital ships, and with the exception of tonnage and gun caliber there is no restriction upon design. The ships must not exceed 35,000 tons each, and the guns must not exceed 16-inch caliber. It is now revealed that the ships will be far in advance of anything now in existence so far as fighting efficiency is concerned. They will make existing battleships obsolete by bringing to bear an overwhelming gun power, concentrated in forward turrets. Nine 16-inch guns can thus be fired in one broadside salvo. The total weight of such a broadside is 20,000 pounds. The 16-inch gun fires a projectile weighing 2,240 pounds, as against the 1,900-pound projectile of a 15-inch gun. The British guns will have a range exceeding 30,000 yards. The ships will have a speed of 21 knots.

The more novel features of these post-Jutland ships are thus described:

Without a funnel showing and scarcely any superstructure they are designed to serve a double purpose. A clear deck space gives a long, broad sweep for the launching of airplanes, thus increasing the vessel's battle radius by hundreds of miles.

Heavily armored decks will be planted as a protection from attack from the air. The magazines are being grouped forward under super-armored decks. The absence of funnels provides unobstructed space for planes. The smoke fumes from the engines will be carried off via tubes extending alongside which will also aid in throwing smoke screens.

The removal of funnels and much of the superstructure, together with increased deck armor, indicate that the British designers are taking advantage of the lessons thus far learned as to the development of air warfare. The tests made by the United States Navy revealed that air bombs would sweep away the smokestacks and practically all of the superstructure of a battleship, besides stunning and strangling the crew. British tests are not being made to measure the effect of air bombardment upon armored decks; the extent to which poison gas from an air bomb will permeate a ship; and the measures that should be taken to defend a ship against night attack from the air.

Thus it will be seen that capital ships are undergoing complete evolution as a result of developments in air warfare. The capital ship of the early future will not only be protected as much as possible against air attack, but it will be equipped with airplanes and means of launching and re-

ceiving airplanes at sea. The deck will be a floating landing field, unobstructed by smokestacks or other superstructure.

Who can figure out the proportionate fighting strength of such a capital ship, as compared with existing battleships? Obviously, comparisons based upon tonnage alone are absurd. As aircraft develops, it is certain that battleships not equipped or accompanied by airplanes will not be able to hold their own against ships like the *Rodney* and *Nelson*. Speed will not save a ship pursued by bombing planes, and big guns are useless against planes. In the night tests last year, airplanes swooped down unseen upon battleships, almost touching the mastheads, and made away without being hit.

The new British naval plans are based upon the fact that an air offensive can only be met by an air force; and that a capital ship need not consume a major part of its space to develop speed so long as it carries airplanes that can go forth and make war for a radius of 200 miles or so from the deck of the ship.

ENGINEERING

High Temperature Materials

The Engineer, 28 November, 1924.—We can remember an eminent professor of engineering, some twenty years ago, when lecturing upon the thermodynamics of the heat engine, predicting that it would not be long before we "worked our engines with red-hot steam at a pressure of 1,000 pounds per square inch." Men to whom 200 pounds per sqaure inch was high boiler pressure, and to whom the application of the mildest superheating was a daring novelty, were not ready to take such a prophecy seriously. Today, however, there can no longer be any doubt that, even though the prophecy we have quoted has not yet been entirely realized, we are working with increasingly high pressures and still more rapidly rising degrees of superheat. Quite elementary thermodynamics serve to explain the increased efficiency in the use of steam or other working fluid which is attained by these means. That the practical difficulties which have been steadily overcome is due to another factor—the increasing demand for economy in power production, and the strenuous competition between the internal combustion engine, on the one hand, and the steam turbine on the other. We have yet to reach the stage when the entry of the internal combustion turbine carries this struggle another step forward. Meanwhile, however, there are very serious problems to be faced, problems which center around the provision of metals possessing satisfactory working strength at the high temperatures involved.

It is unfortunately an almost universal property of metals and of alloys that their strength diminishes with rising temperature. In itself this is not an unmixed evil, since it makes it possible to work the majority of metals with ease in forging press, drop hammer or rolling mill at moderately high temperatures which are easily attainable in industrial processes. Were our metals as hard and strong at a bright red heat as they are at the ordinary temperature we should be confined largely to the use of castings, since in anything but very light sections the power required for shaping them would be prohibitively high and materials hard and strong enough for our rolls and dies would be lacking. Actually, there are a few materials to which this limitation applies. For instance, there is a very hard and strong alloy known under the name of "Stellite," which retains its hardness to so great an extent that it cannot be worked at any temperature and can only be brought to the desired shape by casting. For some rather limited purposes—limited by the high cost of the alloy as well as by the difficulty of working—this material provides a reasonable solution for high-temperature problems. But it is much too limited a solution to

affect the main problem of finding alloys suitable for use in the parts of machines exposed to high temperatures and pressures, yet capable of being readily and economically fashioned to the desired shape and size. So far as the most fundamental of our materials are concerned—iron and steel—the difficulties are not yet acute. It is true that the exposure of cast iron, at least of certain kinds, to highly superheated steam leads to disastrous results, but the strength of mild steel actually increases slightly at first with rising temperature and then only begins to fall off. A temperature range is, however, reached well below a visible red heat, where the falling off in strength becomes serious. When it becomes necessary, however, this difficulty could be met by the use of certain types of alloy steel, such as the high tungsten and chromium steels now widely used for the valves of high-duty internal combustion engines. At or near 1,300°, however, even these fail, thus setting a limit to working temperatures except in cases where they persist only for a fraction of a second, so that the maximum temperature attained by surrounding metal remains much lower, as in the case of internal combustion engines. Where steam is to be used, however, conditions are very different. It is true that steam at 1,300° is not as yet a practical proposition; the increase of working temperatures has, however, been so great and rapid in recent years that we cannot afford to look at such a figure as entirely beyond the range of possibilities, and if that is the view of the engineer it becomes a definite problem for the metallurgist to seek materials capable of meeting such a future demand. The more immediate problem, however, does not relate so much to the primary materials as to those connected with accessories, such as valves and valve seatings, where hitherto the non-ferrous alloys have rendered such good service. The ordinary bronze and brasses, however, become unduly weak and soft at temperatures which are already within the limits of our working ranges. It is perhaps possible to replace these alloys by some kind of ferrous material capable of withstanding higher temperatures, but this would mean abandoning the special advantages on account of which the bronzes have hitherto been successfully used, and, in any case, it is not a development which metallurgists interested in non-ferrous metals can afford to view with indifference.

The ordinary alloys of copper with zinc and tin fail for this purpose, and the aluminium bronzes are not much better. All these can be stiffened to some extent by the addition of more refractory metals such as nickel, but the effect, although marked, does not go far enough to make a radical advance. In the matter both America and France have shown the way, the former by the development of the alloys of the "Nichrome" type consisting mainly of nickel and chromium and a nickel-copper alloy, while in France M. Chevenard, working under the auspices of a great steel firm, has developed a number of special "high temperature" alloys. Some fairly successful efforts in the same direction have since been made here, and we understand that the British Non-ferrous Metals Research Association is taking an interest in this question. It is one undoubtedly to be commended to the attention of our metallurgists. What is needed is a group of alloys not excessively expensive either as regards raw materials or mode of production, capable of being worked up into the necessary shapes with reasonable ease and economy, and capable of resisting working stresses at temperatures of more than 700°—the limit adopted by engineers today—or even higher in the future. We realize that this is not an easy problem and that, at first at all events, such special materials must be more expensive than more ordinary alloys. It is, however, a matter in which it is highly important that British metallurgists should not fall behind.

Stainless Steel

The Engineer, 28 November, 1924.—At an informal meeting of the Junior Institution of Engineers on Friday, November 21, J. G. Hopecraft, in discussing stainless steel, dealt with the methods of working the metal by forging, casting and rolling, *et cetera*, and with the heat treatment. He said that it should be understood that the special properties of stainless steel were inherent properties and not merely superficial. The ability to withstand heat and corrosion and to remain bright were produced immediately after tempering and the removal of the scale, with polishing if necessary. The fact that the steel had to be heat-treated after being worked imposed a limitation on the size of work which could be undertaken, so that the production of large girders, for instance, was not a commercial possibility at the present time. Stainless steel had good heat-resisting qualities, and would not scale up to about 800°, the effect on the surface being confined to color effect only. Stainless steel could not be expected to machine like mild steel, but with the right degree of hardness and a little experience in the use of the tools for the particular job, the turning and screwing, *et cetera*, of the metal could be carried out without much difficulty. A new stainless steel, combining high degree of resistance to corrosion with extreme malleability, had recently been brought out under the name of "Stabrite." This metal could be produced in sheets for cold-pressed articles which required no further heat treatment. It could not be hardened, but could be welded, soldered and brazed fairly easy. Mr. Hopcroft said that the earlier failures of some stainless cutlery were invariably due to wrong heat treatment or wrong forging. Unnecessary allowances were made at first for wear due to polishing knives in machines, a process unnecessary with stainless steel, but now a properly forged blade could be sharpened by any usual means and be entirely satisfactory.

Visible Air Whistle

The *Sperryscope*.—With the coming of the Diesel engine the age of steam is slowly passing. This new propelling power aboard the modern vessel has changed many of the ship's auxiliaries. For example, the time honored steam winch has been replaced by the electric winch, and so it is true with other apparatus aboard ship that is now being powered by electricity, small Diesels and compressed air. The only steam left aboard the motorship is from the low pressure donkey boiler used for the purpose of heating in winter.

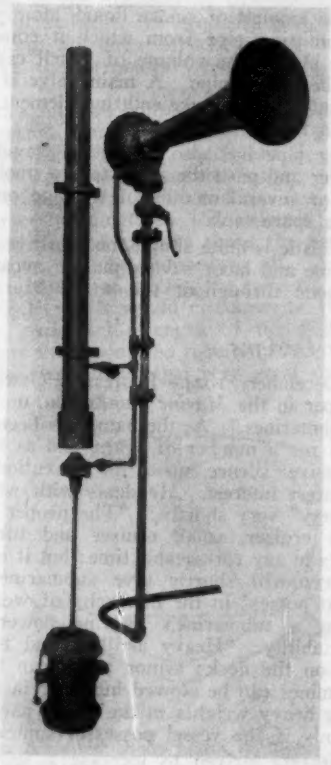
The change brought about the compressed air whistle, but this apparent advancement brought on a serious objection. The sound emitted from the whistle is very important, but the visibility of the cloud of steam from the old steam whistle is equally as important, especially in close water operation.

This condition has led several motorship operators to install a high pressure steam boiler just for use with the whistle, and while absolutely necessary for safety in navigation, it is exceedingly expensive.

This unsatisfactory predicament led the Sperry Company to undertake the development of the Visible Air Whistle which uses the supply of compressed air which is plentiful aboard the motorship, and at the same time gives off a steam cloud that makes each blast visible to an approaching ship. This whistle is now a reality and has proven successful in continuous operation aboard several motorships.

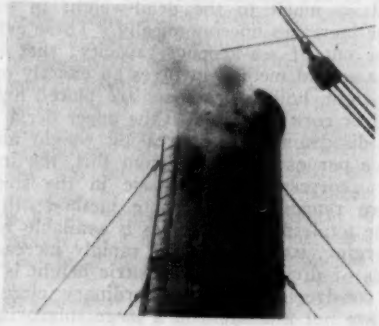
The whistle is of the diaphragm type and of sufficient intensity to answer all requirements.

The smoke making element is composed of a tank filled with the "smoke liquid" which is emitted through an atomizing nozzle and a smoke pipe of suitable proportions.



SPERRY VISIBLE AIR WHISTLE

The air supply for the element is taken either at the whistle proper or at any point between the air whistle and the whistle pull, so that by the opening of the whistle valve it admits air to the nozzle which then takes



VISIBLE AIR WHISTLE IN OPERATION ON THE MOTORSHIP "CHALLENGER"

from the tank a certain amount of smoke liquid, atomizes it and forces the vapor in the smoke emitting pipe from which it comes out in the form of a white and dense cloud; the volume of which can be regulated by a cock on the side of the smoke pipe. A main valve is also located on the supply line so as to shut off the smoke emitting element in case it is desired to use the whistle as a fog signal only.

The smoke emitting pipe has also an outlet provided with a valve so as to act as a scavenger and push the gases to the smoke pipe. The smoke liquid tank is good for several months of average operation, and can be easily replaced with a spare tank.

The Visible Air Whistle is quite simple, but positive in operation; it now joins the family of time and labor saving marine apparatus that has made Sperry products famous throughout the world "for better navigation."

German Submarine Designs

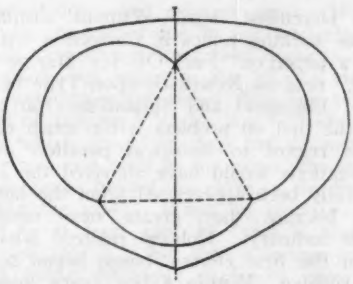
Engineering, 19 December, 1924.—Professor Oswald Flamm has recently published a paper in the *Marine Rundschau,* under the title of "The Problem of Large Submarines." As the name has been connected with this very difficult question for a number of years, and as he has up until now, maintained an impassive silence upon his inventions and designs, his article is of the greatest interest. He deals with what is known as the "capital ship controversy" very shortly: "The proper view to take is that the battleship, battle cruiser, small cruiser and torpedo boat will not disappear, at all events in any foreseeable time; but it must also be admitted that technical progress will shortly give submarines a position which they do not at present possess in the hierarchy of weapons of war." The problem of increasing a submarine's fighting power hinges on the essential question of stability. "Heavy artillery and torpedo tubes can be mounted in barbette on the deck; armor plates can be fitted to the deck and sides; stores of mines can be stowed inboard; in fact, all requirements which involve putting heavy weights in the upper part of the ship, can be complied with, but only if the vessel possesses sufficient stability."

Designers have hitherto striven to increase a submarine's stability by two methods: (1) they have endeavored to lower the position of the center of gravity; and (2) they have tried to raise the position of the center of buoyancy: both have very grave disadvantages. If the first method is adopted, masses of heavy material have to be put low down in the body of the submarine; when these are added to counteract the weight of heavy artillery and armor fitted to the upper deck, above the center of buoyancy, they add so much to the dead-weight in the boat, that her displacement tonnage increases uneconomically. These extra tons of ballast have to be paid for out of sea-keeping capacity; that is, at the expense of fuel supply. The second method involves an exactly opposite procedure. If attempted, water-tight, hollow chambers are placed high up in the boat, and masses of wood or cork are fitted to the upper deck. "Construction on these lines has the disadvantage of increasing weight and of using inside space to no effective purpose." Apart from this, the increase of general buoyancy compels a corresponding increase in the size of the flooding chambers. . . . There remains an alternate method: that of so shaping the hull (1) that the total space it occupies is available for useful qualities, (2) that, on submerging, its displacement rapidly increases, and (3) that, in all critical periods of diving, the metacentric height is sufficient.

If the boat is constructed with the ordinary circular cross section, these requirements are not attainable in a large submarine, for the following reason. The structural strength of the hull at a constant depth, has to

be made proportional to the diameter of the submarine: it follows, therefore, that, if the boat is large, the requisite peripheral strength can only be obtained by making the outer structure very heavy; and if the boat becomes really large this structural weight soon reaches an unmanageable figure.

Professor Flamm's solution had better be described in his own words: "The problem, it seems, can only be solved by giving the boat a cross section, made up of three circles, which are described round the sides of a triangle with its apex upwards (see diagram).* It is easy to understand, that, if the triangle, the radii, and the positions of the centers of the circles are correctly calculated [*lit.* selected], there will not be a maximum of stability but the stresses along the base of the triangle, due to hydrostatic pressure, will be reduced to nil. As the component parts of the cross section are arcs of circles, the radii of which are smaller than the radius of the circle which would circumscribe the whole cross section, it follows that the structural strength of the hull required along these separate circles is less than would be required if the cross section were one single circle, with the consequence that very great strength is not necessary.



Professor Flamm designed three boats on these lines; the first, with a displacement of 1,443 tons, carried 134 tons of deck armor; the second, a submarine cruiser of about 7,067 tons had 614 tons of deck and side armor, about 500 tons of heavy barbetted and lighter guns, and deck torpedo tubes; the third, a minelaying cruiser of 7,734 tons carried a thousand mines on the mine deck over the pressure-resisting part of the hull. In each case the diving stability diagram showed extraordinarily good figures, although no ballast of any kind was allowed for in the calculations.

Professor Flamm admits that it might be asked whether the military value of these large submarines justifies their construction. He considers that they may be compared with the British monitors off the Flanders coast. "If an armored submarine with heavy artillery engages other ships with her deck awash, she is barely visible at long ranges, and can attack the unprotected parts of larger vessels, and keep them effectively under fire. It has to be allowed that a chance shot may put the submarine out of action; but the war on the Flanders coast, showed how rarely hits could be obtained even by stationary forts ashore. More than that, a large submarine's heavy torpedo armament ought to protect her from an attack at close range. The military value of the large submarine minelayer consists in her high speed, and her exceptional radius of action. She

* In the diagram attached to Professor Flamm's paper the triangle was equilateral. He none the less used the term "apex upwards." "*Spitze nach oben liegenden Dreiecks*," showing that in his own particular designs the triangle was isosocles. He gives no clue at all as to the proportion between the length of the base and the side which he found most suitable.

can be independent of the shore for many months; so that nobody can discover her zone of operations when once she has left her base."

Professor Flamm maintains that the British *X* class, now being built, do not overcome the defects of which his own designs are free. They have heavy deck guns; but they carry 250 tons of ballast as a compensation. "This useless dead-weight necessarily lowers speed, radius of action, and increases running costs; but, if this kind of construction is adopted, there is always the chance that, when the boat submerges in a seaway, the enormous moment of inertia of the upper mass, and that of the compensating ballast, placed lower down, may put her in danger. A boat's rolling period increases with an increased moment of inertia; it may, therefore, happen that the righting moment no longer suffices to bring the boat back to an even keel, if she has been rolled to a certain angle owing to her moment of inertia. This danger becomes acute when a boat is at the critical phase of submerging, that is, when the centers of buoyancy and of gravity coincide." He adds the interesting remark that the British Admiralty has known every detail about his designs since 1919.

Fuel Oil For Marine Engines

Engineering, 19 December, 1924.—Without wishing to question that "there are still some burning topics in connection with oil," as Sterry B. Freeman put it in a paper on "Fuel Oil for Marine Internal-Combustion and Steam Engines," read at Newcastle-upon-Tyne before the North East Coast Institution of Engineers and Shipbuilders on the twelfth inst., we would submit that the fuel oil problem it too much considered as singular and with too little regard to historical parallels and the time factor. Few technical innovations would have survived the infant stage, if their complications had fully been appreciated from the outset. The difficulties adjust themselves because they create new needs which indirectly strengthen the new industry. Nobody realized what electric light and power meant, when the first electric lamps began to glow and the first electric motors to revolve. Within a few years, however, the old rivals, gas for light and coal for power, felt the beneficial influence of the competitive stimulation, and there is no reason why oil and coal should not both prosper in healthy competition.

Automobiles have become possible because fuel oils are available, and oil mining is profitable because automobiles want the oil. Mr. Freeman seemed a little alarmed because the United States have already to import oil from Mexico. That, however, is a question of reciprocal trading. If the average daily production of each American well is only four and a half barrels, the fact proves that too many wells have been drilled rather than that the actual fields are exhausted. Even if wells appear to be exhausted, so far as present methods of petroleum mining are concerned, it is quite realized that a good deal of oil is left underground. There the time factor comes in, to which Mr. Freeman did not refer. Much of the oil was probably not formed at the spot from which it is brought up. When the drilling and pumping, which enabled the gas to escape and the water to accumulate, are stopped, more oil—possibly newly-formed—may find its way into the old layers. This suggestion may, of course, be an idle speculation. New fields are still being discovered every year, and if the assessment of the world's oil supply cannot be completed for many years, this does not mean that any assessment is futile. In any case the vast deposits of oil shales and tar sands still await exploitation. It is true that the Scottish oil shale industry could not thrive were it not for the by-products of the oil, but Canada, to take an example, wants oil; her oil shales and tar sands may help to build up a chemical industry before the oil industry develops; the country will profit in either case.

The shipbuilder has to make up his mind whether to design for coal or for oil-fuel; to equip generally for either would, for the present, be too expensive. The itinerary of the ship is an important consideration. At present a steamer is more likely to find coal stores than to find oil tanks in remote ports; that will change with time. Mr. Freeman tacitly barred the use of crude oil as fuel. He distinguished between "engine fuel," the distillation product, suitable for Diesel engines, and "boiler fuel," the distillation residue, without vetoing alternative uses.

As regards engine fuel, he pointed out the engineer would like to know what kind of oil he is taking on board. Unfortunately, the oil-supplying companies will not guarantee more than "a good merchantable oil," because they have to replenish their storage tanks with oil from different tank steamers. Mr. Freeman's general specifications for a Diesel engine oil would be: specific gravity, between 0.83 and 0.92; flash point, 150° F.; ash, not more than 0.05 per cent and free of iron or silica; asphalt, less than 5 per cent; water, not to exceed 1 per cent; solidification point, below 21° F.; gross calodific value, over 18,500 B.Th.U.; viscosity sufficiently low to admit of fuel pumping at 40° F. He did not expect much trouble from the ordinary sulphur contents of the oil, which would not damage the valves, because the sulphuric acid formed would not be condensed, though it would corrode the silencers and exhaust pipes. Much of the damage attributed to sulphur he considered due to the hard asphalt, which carried the sulphur and which gave rise to hard coke deposits.

Mr. Freeman's remarks on water in the oil, its viscosity, and on the handling of the oil, were more important than his average and ultimate analyses and notes on oil refining. Water was best separated out of boiler fuel in settling tanks which should be deep and of small horizontal area; when changing over from one tank to the other, the suction valve on the second tank should be opened before the valve on the first tank was closed, lest air be drawn into the pipes. When an emulsion had been formed, oil should be heated to at least 170° F. (that is higher, than the now admissible flash-point of 150° F.), but then a danger might arise that any hot water drawn off might discharge explosive vapors into the engine-room. Water got into the oil from the cellular tanks in the double-bottoms which were also used as ballast tanks. Viscous oils had to be heated for circulation; cellular tanks required 1.5 square feet of heating surface per ton of oil. The complete training of the tanks was almost impossible with viscous oils. The expansion of the hot oil had to be allowed for, being about one per cent per 25° F. Water in engine fuel oil was best separated in centrifugal apparatus.

Legislation and the classification rules have added to the difficulties of the advocates of oil fuel on ship board. To be classed, a ship using oil has to satisfy special conditions as to structural tests, drainage, ventilation, manipulation of valves from deck, and fire-protection, including foam-producing installations, and some of the requisite appliances, Mr. Freeman states, are subject to rapid depreciation. Finally, fuel-oil prices are rising, partly owing to financial manipulation. As oil prices rise, coal prices go down, and thus a check is put on the wasteful use of oil which certainly should be suppressed. The coal and fuel-oil problems will be solved together; the solutions are yet in the laboratory stage, but the future is promising.

United States' Production and Consumption of Oil

Engineering, 5 December, 1924.—Statistics now show that, in spite of her enormous oil fields, the United States consumes more than she produces. In January, 1922, the country was producing about 1,400,000 barrels daily, and in April of last year this figure had risen to 2,000,000, and was con-

siderably in excess of this in the summer and autumn of 1923. Throughout this period, however, the average daily consumption has varied from 1,450,000 to 2,100,000 barrels. The daily difference between consumption and production has sometimes been 1,000,000 barrels. Only once has the position been reversed; between April and November, 1923, the country produced rather more than it consumed; after that productions fell off again.

The situation has caused considerable anxiety; for its consequences are that the oil-producing companies bring great pressure to bear upon the administration for new concessions on oil-producing lands which have been treated as reserves for purposes of national defense. The controversy recently came to a head when Captain John Halligan, of the United States Navy, drew public attention to the encroachments which were being made by private companies on the naval oil reserves of the Teapot Dome fields. Captain Halligan claimed that concessions had been granted to the Sinclair interests which would drain the Teapot Dome estate, and so deprive the Navy of a large proportion of supplies which ought not to be touched. He considered the situation the more dangerous in that experts calculated that the United States had only twenty years' oil supply underground, after which it would depend on overseas supplies. He further argued that an administrative change had made the Navy's control over its oil supplies insecure. "Until May, 1921, the naval petroleum reserves were administered by the Navy Department, with such assistance as was required from the Department of Justice and the Interior. Soon after the naval petroleum reserves were turned over to the Department of the Interior, with the result that "there has been effected a radical change of policy from conservation to exploitation under conditions which prevented the presentation of arguments against such a change of policy. These arguments would, I believe, have been conclusive."

The correspondence provoked a long and detailed answer from the Secretary of the Navy. He stated that the administrative change had been necessary, in that the Department of the Interior had custody of over 6,000,000 acres of government oil lands, and that it was, therefore, proper that the naval oil reserves of rather more than 200,000 acres should be administered by them as well. The remainder of his letter seemed in great measure to justify Captain Halligan, for an expert from the geological department admitted that the development on the northwestern boundary of the naval reserve would ultimately drain the reserve itself. In these circumstances, the Secretary of the Navy urged that the only policy to pursue was to get as much oil as possible out of the Teapot Dome reserve, by exploiting it in time.

The controversy provoked some interesting opinions about British oil policy. Groups of American senators seem to think that, while America is squandering resources which are essential to her national defense, Great Britain is slowly absorbing the world's supplies. As the Secretary of the Navy admitted that America's oil supply must be adjusted for "probable campaigns in the Atlantic and the Pacific," this, naturally, causes anxiety. Statistics do not, however, confirm what the American senators have stated so emphatically. During 1923, Great Britain consumed about 5,000,000 tons of oil and imported rather more than half of this amount from America.

Reconditioning the "Leviathan"

The Engineer, 19 December, 1924.—An effort is to be made apparently to increase the speed of the United States liner *Leviathan* by fitting her with new propellers during her winter overhaul and reconditioning. According to a correspondent of the *Journal of Commerce*, the new propellers will be of the three-bladed type, and will be of a slightly different pitch

from those now employed. They are designed, we learn, from the results of experiments which have been made by American naval experts. It is estimated that with new propellers the speed of the ship may be increased by half a knot or the present average speed may be maintained with a saving of some 6,000 shaft horsepower. We learn that the four-bladed propellers with which the liner is now equipped, and which represents pre-war practice, are now considered to be out of date. The new design of propeller will be slightly smaller than that which was used for the liner *George Washington*, belonging to the same company. The propellers for that ship measure twenty-three feet three inches in diameter and have a weight of about fourteen tons, making them the largest propellers ever constructed in America.

Navy Engine Progress

Army and Navy Journal, 20 December, 1924.—The decision to equip the Chinese gunboats with Diesel engines forecasts a further development of oil engines for the Navy. When the time comes to build new battleships under the treaty, the question as to whether Diesel engines will be used will be a live issue. In some quarters it is believed the Diesel engine by that time will develop to a point at which they will be the most effective power for the capital ship.

The Navy has been a pioneer in the Diesel engine movement. Ten or twelve years ago the Diesel engine was installed in the *Maumee*. It was the first large seagoing ship to be equipped with oil engines, and it was an object lesson to commercial ships.

AERONAUTICS

Extracts from the Tenth Annual Report of the N.A.C.A.

Aviation, 22 December, 1924.—The development of helium production facilities has proceeded rapidly although most of the effort has been expended on the actual production. Many valuable improvements in the process of extracting the helium have been developed and as a result it is possible to predict more efficient production at a lower cost.

With the use of helium it was necessary to develop a method for preventing the valving of the helium as the airship became lighter due to the consumption of fuel. A successful method of water recovery from the exhaust gas from the engine is now in operation.

The present status of airship development should not blind us to the necessity for further research. In particular, there still remains much to be known regarding the loads encountered by airships in flight. Full-size tests on the *Shenandoah* and the *Los Angeles* should be made to determine the aerodynamic loads. At the same time a study should be made on the structure of the airship by means of strain gages. These studies are of especial importance in view of the probability that future airships will have capacities of 5,000,000 cubic feet and more.

The following policy of the Army and Navy relating to aircraft has been approved by the Joint Army and Navy Board and by the War and Navy Departments, and has been published to the services for their information and guidance.

"Aircraft to be used in the operations of war shall be designated: (a) army aircraft (b) navy aircraft; (c) marine aircraft.

"Army aircraft are those provided by the War Department and manned by army personnel.

"Navy aircraft are those provided by the Navy Department and manned by navy personnel.

"Marine aircraft are those provided by the Navy Department and manned by marine corps personnel.

"The marine air service is a branch of the naval air service.

"The functions of the army, navy, and marine aircraft are as follows:

"*Army aircraft.* Operations from bases on shore—

(a) As an arm of the mobile Army;

(b) Against enemy aircraft in defense of all shore establishments;

(c) Alone or in cooperation with other arms of the Army or with the Navy, against enemy vessels engaged in attacks on the coast such as—

(I) Bombardment of the coast;

(II) Operations preparatory to or of landing troops;

(III) Operations such as mine laying or attacks on shipping in the vicinity of defended ports.

"*Navy aircraft.* Operations from mobile floating bases or from naval air stations on shore—

(a) As an arm of the fleet;

(b) For overseas scouting;

(c) Against enemy establishments on shore when such operations are conducted in cooperation with other types of naval forces, or alone when their mission is primarily naval;

(d) To protect coastal sea communications by—

(I) Reconnaissance and patrol of coastal sea areas;

(II) Convoy operations;

(III) Attacks on enemy submarines, aircraft, or surface vessels engaged in trade prevention, or in passage through the sea area.

(e) Alone or in cooperation, with other arms of the Navy, or with the Army, against enemy vessels engaged in attacks on the coast.

"*Marine aircraft.* The functions normally assigned to army aircraft shall be performed by the marine aircraft when the operations are in connection with an advance base in which operations of the Army are not represented. When army and marine aircraft are cooperating on shore, the control of their operations shall be governed by the one hundred and twentieth article of war, United States Army.

"The functions of aircraft assigned under Army (c) and Navy (e) are a duplication of functions. In such operations cooperation is vital to success. Such cooperation shall be governed by the following provisions:

(a) The naval district forces, vessels and aircraft, will never be strong enough to prevent an attack on the coast by major units of the enemy fleet. When , therefore, an enemy force of a strength greatly superior to that of the naval forces available for use against it, approaches the coast, the commander of the naval force shall inform the commander of the Army department of the situation; shall assume that the Army has a paramount interest in the operation, and shall coordinate the operations of the naval forces with those of the military forces.

(b) If, however, the conditions are such that the enemy is, or can be, engaged by a naval force approximating in strength to that of the enemy, the commander of the Army Department shall be informed and he shall assume that the Navy has a paramount interest in the operation and shall coordinate the operations of the military forces with those of the naval forces.

"The functions of aircraft above assigned, shall govern in the production of aviation equipment, training of aviation personnel, and establishment of air stations for the War and Navy Departments. Such assignment

shall not prevent the employment of army and marine aircraft in naval functions upon the request of the senior naval officer present or vice versa, the employment of naval aircraft in Army functions upon request of the senior army or marine officer present on shore; nor shall it prevent the employment of army, navy or marine aircraft when no other air service is cooperating in the operation, in any manner which will be most effective in accomplishing the mission of the force.

"All questions regarding the policy of the War and Navy Departments with regard to the tactical and strategical functions of aircraft, and to the location of air stations, shall be addressed to the Joint Board for consideration and recommendation to the Secretary of War and the Secretary of the Navy."

The Limitation of Armaments Conference held in Washington in 1921-22, on invitation of President Harding, examined into the possibility of limiting aviation development for war purposes and limiting the use of aircraft in warfare. A special committee of aviation experts representing the United States, Great Britain, France, Italy and Japan, was appointed. That committee submitted a report which reviewed the situation at length. The "Final Conclusions" of the report follow:

"The committee is of the opinion that it is not practicable to impose any effective limitations upon the numbers of characteristics of aircraft, either commercial or military, except in the single case of lighter-than-air craft. The committee is of the opinion that the use of aircraft in warfare should be governed by the rules of warfare as adapted to aircraft by a further conference which should be held at a later date."

The fact that the Limitation of Armaments Conference placed no restriction on the development and application of aircraft for war purposes assures the greater relative importance of aircraft in future warfare. It is a maxim of military science, that an army and a nation must be adaptable to changes in time of war. The best-laid plans, whether for offensive or defensive warfare, are usually upset either by the success of the enemy or by changes and developments in the art of warfare. No one can foretell at this time what the use of aircraft will be in future wars, not even in the next war. It is safe to say that there will be individual and group fighting in the air; there will be aircraft attacking troops on the ground, both with bombs dropped from great heights and with machine guns mounted on low flying aircraft protected by armor from ordinary rifle bullets; there will be bombing of large cities, military and manufacturing centers, and routes of communication and transportation, and it has been proposed that aircraft be used to drop poisonous gases, not only on the enemy troops but also behind the lines and in the centers of population, to the same extent that long-distance bombing will be carried on. The bombs carried may not be limited to explosives and poisonous gases but may possibly be loaded with germs to spread disease and pestilence. Without limitations on the uses of aircraft in warfare, a nation fighting with its back to the wall cannot be expected to omit to use desperate means to starve off defeat. The uses of aircraft in warfare would then be limited only by the inability of human ingenuity to conceive further uses for this new agency of destruction.

A conference was held at The Hague in 1923, attended by delegates of the United States, which drafted rules and regulations covering the use of aircraft war. There was evident a tendency to minimize as much as possible aircraft attack upon centers of population with the resulting consequences to non-combatants and to restrict such attacks to what are military objectives. In spite of the rules thus formulated and even if they should be universally adopted, it is still inevitable that aircraft attacks would greatly terrify and undoubtedly seriously injure and damage many who have heretofore been classed as non-combatants.

It is believed quite probable that if the nations of the world do maintain adequate air forces, this may tend to the adjustment of international disagreements by conference, as the delegates to such conferences will have the strong backing of their national air forces capable of such destructive effect as that mentioned above. When wars were fought within a limited territory by ground troops, the national patriotism of non-combatants strongly supported their armed forces, but in future wars when air power becomes a most vital factor in national defense, theaters of operation will no longer be limited to restricted territories and non-combatants will probably and unavoidably be subjected to far greater personal damage and injury than in the past. It is not inconceivable that such pressure will be brought to bear upon the governments concerned by their non-combatants, following a series of aircraft raids, that an early cessation of hostilities will be more earnestly desired by the people on both sides and will be forced by popular demand upon the nation least efficient in air power.

Aviation has made itself indispensable to military and naval operations. Under our present organization, where the function of national defense is vested principally in the War and Navy Departments, we must look to those departments to develop the possibilities of aviation in warfare, whether to be used in conjunction with military and naval operations, or to be used independently for attacking distant points behind the enemy's lines, or elsewhere. The problem of the air defense of this country is worthy of most careful study.

$1,000,000 Seaplane Order is Placed

Washington *Star,* 14 January, 1925.—A million dollars' worth of seaplanes has been ordered by the Bureau of Aeronautics, Navy Department, it was learned today, with the granting of a contract to the Glen L. Martin Company, of Cleveland for 40 *SC-2* seaplanes, capable of performing the duties heretofore undertaken by torpedo, bombing and scout planes.

Work on the new ships will begin immediately. On their completion the Navy will have seventy-five *SC* types of planes, a contract for thirty-five *SC-1's* having been let by the bureau to the Martin Company last June.

Convertible to either land or sea duty, the planes will be used aboard the *Langley* and future aircraft carriers or aboard battleships as seaplanes, catapults now in possession of the Navy being capable of shooting them off into the air. Their value to the battleship, however, is not as important as the scout and fighting planes and it is not probable that many will be assigned to the fleet afloat.

The new *SC's* will be powered with a Wright motor of more than 600 horsepower, which will be capable of carrying about 3,600 pounds dead weight in the air. The planes have pontoons which can be changed in a short time to wheels, for land or aircraft carrier duty. In endurance tests they have flown officially more than 15 hours at the Naval Air Station, Anacostia, D. C., where they were put through rigorous tests before production was ordered.

These planes will supplant the two types now used for bombing and scouting—the *Douglas* torpedo plane and the *F-5-L* plane. The former resembles the world cruisers in type, while the latter are boat seaplanes with a hull and two motors. In addition, the Navy has a meritorious patrol plane of the hull and bi-motored type in the *PN* design, which already holds several official seaplane records.

Aircraft Course Urged for Naval Academy

Baltimore *Sun,* 10 January, 1924.—Washington, January 9.—Legislation to provide technical instruction in aircraft for all midshipmen of the

Naval Academy and a course for those who wish to specialize in this branch of the naval service will be introduced in the next Congress by Representative James V. McClintic, Democrat, of Oklahoma.

Mr. McClintic said today that he believed a majority of the Naval Affairs Committee, of which he is a member, would favor the proposal, but that it is too late to take it up in this session.

Mr. McClintic said details of this plan would depend upon the views of the Navy Department. However, he said, he had in mind the establishment of a small flying field at the academy.

ORDNANCE

Navy Yard Testing Ejectors to Blow out Gases in Guns

Ordnance Experts Want Type More Powerful Than System Now in Use. —Washington *Post*, 4 January, 1925.—Important tests of different kinds of ejectors for blowing gases out of guns after firing are under way at the Washington Navy Yard and the Indianhead Proving Ground. Experts of the naval bureau of ordnance entertain the expectation of success in the design of a better gas-ejection than now is in use. It is hoped to produce a type that will be more powerful, capable of introducing more air and of blowing out of the gun anything that may be left there after a round is fired.

At present the air is introduced through six radial holes, inclined at an angle to the axis of the bore, at a pressure of 160 pounds. This is supposed to blow out everything. It appears to be efficient, and for more than seventeen years the system has been regarded as effective in all respects.

However, Rear Admiral Claude C. Bloch, chief of the bureau of ordnance, is desirous of having the gas-ejection system improved. With that in mind, he is considering the practicability of introducing water into the bore, with the idea that if any smoldering particles remain that might preignite the next charge of powder the water would extinguish it and obviate danger of a flareback after insertion of a new charge and before closure of the breech lock.

Admiral Bloch believes that upon completion of the tests now under way, probably in the course of the next two months, it may be decided that certain changes advantageously may be made in all major-caliber guns toward improving the gas-ejector system.

NAVIGATION AND RADIO

Millions Needed for Naval Radio

Washington *Star*, 10 January, 1925.—The United States Navy is planning a perfect system of radio communication both afloat and ashore, but it will take several years' time, according to Admiral Robinson, chief of the bureau of engineering of the Navy. The complete modernization of naval radio would require about $8,500,000. Of this sum, $6,605,595 would be put into radio apparatus on ships in commission, approximately $500,000 more for other ships and $125,000 for annual maintenance and repairs. Shore station improvements would approximate nearly $1,500,000 more.

The above figures apply to peace-time conditions; in the event of war, $15,684,000 would be required for radio equipment, half of it for ships in commission, the balance for ships in reserve and new ships under construction. Considering all the apparatus in use today, it is difficult to arrive at an exact value for the present radio communication system of the Navy, but the ship radio equipment is estimated as worth about $7,500,000. Although this could not be raised at a forced sale, it is pointed out, its replacement today would cost $15,700,000.

The amount required to modernize the fleet radio equipment—over six and a half million dollars—would be used to replace spark sets with tube transmitters, to replace obsolete receiving equipment, some of which was designed in 1915, and receiving sets using the broadcast band of wave lengths no longer available to naval vessels. This sum would also provide for accurate measuring apparatus which would enable the naval operators to keep on their assigned wave channels, and would cover apparatus permitting most ships to operate in duplex—that is, receive and send several messages simultaneously, as is essential in battle. Some capital ships require at least eight separate radio channels for communication.

Admiral Robinson deems it expedient to put as much as $550,000 into communication equipment on vessels in commission in 1926, and has asked Congress for that amount. He regards $150,000 as essential to the modernization of the naval communication system afloat. Out of the grand total he desires to expend the balance for duplexing two battleships and six cruisers, outfitting each with a complete modern transmitting and receiving system at a total cost estimated at $80,000. He plans to spend $235,000 in equipping ten battleships, nine cruisers, eight auxiliary vessels and nineteen destroyers with high-frequency apparatus replacing spark sets; and to expend $24,000 on new radio-frequency receivers in place of obsolete sets on three battleships and six cruisers. About $60,000 would be used to equip four vessels with complete underwater sound gear.

Naval radio apparatus, it is pointed out, is far more expensive than that used ashore by amateurs and listeners-in, for the reason that it is not desired in such great quantities and because of special requirements, making it impractical for commercial use. Suitable wave meters and measuring apparatus designed for naval use, for example, cost approximately $500 each, and when only about fifty or so are ordered, it is seen that manufacturers cannot follow their usual quantity-production methods, so the cost is far higher than when a thousand or ten thousand sets are made from one model.

On the land end of its great communication system, which handles more than 50,000,000 words a year, the Navy has asked Congress for $404,000 for radio improvements, having spent more than that sum in 1924, and requests $930,000 for maintenance in 1926, approximately the same amount as was expended during the current year. The maintenance provides for the upkeep of eighty-nine shore radio traffic stations and about fifty radio compass stations.

MISCELLANEOUS

New Naval Limitation Conference Predicted

By Captain Dudley W. Knox, U. S. N., Retired, Baltimore *Sun*, 7 January, 1925.—Washington, January 6.—There seems to be little doubt that we are on the eve of another conference upon the matter of limiting naval armaments. Within two weeks we had the frank statement of Chairman Butler, of the House Naval Committee, that President Coolidge expressed to him the belief that during 1925 such a conference would be called.

Within a week we have read reports of the intended resolution of Senator Borah respecting a new conference which would include economic questions, and further reports of conversations between the Senator and the President, after which it was agreed to omit economic considerations at this time.

As Senator Borah has pointed out, we are on the verge of a new era of very expensive naval competitive building unless something is done soon.

The present limitation agreement is only partial, in that it applies only to some classes of ships and not to other classes, as has been explained at some length in a previous article in *The Sun*.

The river of excessive naval expenditure was dammed in one channel, but left open in another, which may easily become equally large. The process of erosion in this undammed channel has already begun on a large scale, through great building programs abroad and inevitable projects at home to meet them. Unless a second dam is soon constructed, the first will certainly fail to serve its purpose. To be effective, limitation agreements must include all types of naval vessels.

Stopping the leaks incident to merely partial limitation of naval armament constitutes the only important naval element in the American desire for a new conference. We would like to see the original, well-balanced, comprehensive arms limitation plan of Mr. Hughes, proposed at the opening of the first conference, placed in effect. Only in this way is it likely that the primary purposes of the existing agreement as expressed in the preamble—the maintenance of the general peace and the reduction of the burdens of competitive armaments—can be accomplished. This is the American viewpoint of the naval factors in a nutshell, but it is probable that other nations will approach the new conference from their own angles, which special circumstances render somewhat different from our own.

In the case of Great Britain, for example, the matter of abolishing submarines will assume major importance in this conference, just as it did in the last one. This is a natural reaction from the bitter experience of the late war, when the very life of Britain was placed in serious jeopardy for many crucial months solely by the operations of submarines. While meantime there have been many important developments in the methods of successfully dealing with submarines, nevertheless, the geographical situation of the British Isles renders them peculiarly vulnerable to the submarine threat. It is reasonable to expect the British again to bring up forcibly the question of abolishing submarines.

It is not improbable that the British will also contend for a more substantial general reduction in naval ships of all types than even Mr. Hughes proposed originally. This for two reasons: First, the burden of supporting a large navy bears upon the British taxpayer in this time of post-war economic readjustment. Second, the closer that all navies approach the vanishing point, provided they are all reduced together, the greater the British preponderance in sea power. This is true because of the relatively great British merchant marine, which, in the event of excessively small naval forces of man-of-war type, would become of vital importance as combatant sea power in time of war.

The inherent interests of France are likely to lead her to oppose British contentions in the above sense at the new conference. Having accepted a small quota of battleships, France undoubtedly feels the need of liberal allowances of submarines and other auxiliary naval strength in order to protect her vital communications across the Mediterranean to Algeria and Morocco. To prevent being overwhelmed by a possible repetition of the German assault in 1914, France simply must have reinforcements from her North African colonies. There seems virtually no doubt that the French will flatly refuse to consider the abolition of submarines, and will firmly insist upon a quota of these vessels and other naval auxiliaries at least as great as proposed originally by Secretary of State Hughes. As to a further general reduction of capital ship strength, the French quota is already so small that the accidental loss of one ship will amount to a large percentage reduction of total strength. This practical condition seems likely to cause the French to resist steps which would be even nearer to putting all her eggs in one basket. In this respect Italy is in

the same situation as France, since their battle allowances are equal under the existing treaty. Therefore, Italy probably will stand with France in opposing reduction of capital ships.

Finally, we have to consider the probable attitude of Japan, who has been spending approximately fifty per cent of her national budget upon armaments. She already has in hand a large program of cruiser and other auxiliary construction, laid down or projected since the last conference. This program is of such proportions as substantially to increase her ratio of strength accepted as reasonable at the last conference, which ratio was then based upon the status quo. It seems more than probable that Japan will argue for the new status quo in establishing her ratio higher than 3-5 in relation to Britain and to ourselves. Probably the best reply which the other nations can make to this is the formal acceptance by all the delegates to the last conference of the principles of the Hughes' proposals made there, which included the 5-3 ratio for auxiliary tonnage as well as capital ships.

The sensitiveness of the Japanese to the proposed British base at Singapore is almost certain to cause the former to plead for the extension of the present area in which increased base facilities are now forbidden by agreement. Singapore lies outside the restricted area by only a few miles. It is scarcely expected that the British will consent to give up their right to the Singapore base, as they did in the case of Hongkong. The Australians have been very insistent upon the Singapore base as being indispensable to their protection by the British fleet and their contention appears to be sound.

Considering the criss-crossing of national interests it seems more probable that agreement at the new conference can be reached along the line of the proposals made by Mr. Hughes upon opening the first conference than on any other basis. That is the maximum which can be reasonably expected from the new negotiations in the purely naval sphere, though other related questions are likely to come up. Certain of the previous agreements respecting China have not yet been ratified.

At the last conference they were considered as a vital step in the problem of naval limitation and still remain so. Undoubtedly a new effort will be made to stabilize this phase of the matter. Then there are also questions as to land and air armaments which need further consideration by the powers.

Naval Engineers Have in View Vastly Improved Battleships

Washington *Star*, 15 January, 1925.—Naval engineers would hesitate today to predict what the military characteristics will be of the first American battleships to be built in replacement under the Washington limitation treaty. Aside from the fact that they will be twenty-five per cent bigger than the present Navy, *Leviathans, West Virginia, Colorado* and *Maryland*, and carry not larger than 16-inch guns, they are unknown quantities.

The first two replacement ships may be laid down in 1931, to be completed in 1934, when the 12-inch gunners *Florida* and *Utah* will go to the scrap heap. They will be 35,000 tons, treaty measurement, which means almost 40,000 tons, pre-treaty rating. The *West Virginia* class of battleships, now the biggest and hardest hitting vessels afloat, are 32,000 tons, old rating.

Since the first post-treaty battleships will be the British *Rodney* and *Nelson*, to be completed in 1926, when four ships of the present British fleet of the *King George V* class will go to the junk man, wide interest prevails in naval circles everywhere as to what their armament, speed, cruising radius, protection, method of propulsion or other characteristics will prove to be. Little is known generally as to the British plans, developed since the Washington Conference.

But no naval officer is likely to forget that the dreadnaught, first all-big-gun ship to be built, virtually rendered obsolete every existing pre-dreadnaught battleship of any navy. Nothing then afloat could compete with her on anything approaching equal terms, and the feverish building of dreadnaughts on both sides of the Atlantic began.

American naval designers are storing away information on which plans for their own new ships will be based. Experiments incidental to the sinking of the hull of what was to have been the battleship *Washington* were conducted for this purpose, to a large extent, and much valuable data resulted.

For one thing, navy experts wanted to know just how wisely they had planned the increased deck protection of the *Washington* class of ships. It has not been revealed definitely whether the *Washington* deck armor withstood high angle fire, but Secretary Wilbur announced at the time that results of the experiments had justified expectations.

That the new British ships will have ample deck protection, as well as a new type of 16-inch guns more powerful than any yet afloat in any navy, is taken as a foregone conclusion. They will be the product of the post-war years of study by British experts of bitter war experience with fighting ships. It is to be expected, therefore, in the judgment of naval experts, that they will outclass even the *West Virginia* class in the American Navy by a margin beyond that of their twenty-five per cent larger size.

Size alone would permit their carrying heavier armament, probably allowing them to carry twelve 16-inch guns each as against the eight gun batteries of the American first line trio, and the British guns, gun for gun, will be better because of newer design. That would mean at the very least, if the guns were of equal power, a thirty-three per cent superiority in broadside weight for the new Britishers.

Captain Knox Discusses Battle of Jutland

By Captain Dudley W. Knox, U.S.N., Retired, Baltimore *Sun*, 10 January, 1925.—Washington, January 8.—Bitter controversy over the battle of Jutland appears to have been fired afresh in England by the publication on Tuesday of a book entitled *The Jutland Scandal*, the author of which is Admiral Sir Reginald Bacon. An advance outline of the main heads of the indictment of Admiral Beatty in the new book was published in *The Sun* on Tuesday in a dispatch from its correspondent, Hector C. Bywater, the eminent British naval critic.

Like several previous books on the same subject, this last one appears, unfortunately, to fulminate in personalities. Commander Bellair's book, published in 1920, was a scathing attack upon Admiral Jellicoe. Beatty now comes in for his share of counter-invective, notwithstanding his high office of First Sea Lord of the Admiralty.

Interest in this phase of the matter in this country will be limited. What really counts in battle is not personalities, but performances. We may dismiss the attack on Beatty's personality, based largely upon his alleged inexperience, by noting that he had had several years more experience before the battle of Jutland than Nelson was possessed of before the classic victory of the Nile.

Eliminating personalities, there remain four principal charges brought forth in the new book against Admiral Beatty:

1—That whatever failure occurred at Jutland was the fault not of Jellicoe but of his subordinate, Beatty.

2—That Beatty committed an "unpardonable blunder" at the opening of the action by attacking the five German battle cruisers with his six battle cruisers without waiting for his reinforcements of four fast battleships, then seven miles astern.

3—That the loss of two British battle cruisers early in the battle was due to bad shooting, for which Beatty was to blame.

4—That Beatty's failure to maintain touch with the enemy while leading them toward the Grand Fleet left Jellicoe without precise information to guide his deployment.

In regard to the first charge—that of the responsibility of Beatty for whatever failure occurred—it is difficult to see how this can be sustained. Beatty's principal part in the battle was in conducting the relatively small advance detachment of the Grand Fleet during a running fight of about three hours with the German scouting forces, at the end of which time the two main fleets came within sight of each other.

The large issue had, of necessity, to depend upon the conflicting efforts of the fleets as a whole. After coming into contact they fought intermittently for more than two hours of daylight and six hours of darkness, during which the Grand Fleet was handled under the precise direction of Admiral Jellicoe. In these latter phases the operations of Beatty were of comparatively minor consequence. Only through the decisions and directions of the commander-in-chief could anything decisive then be done. Necessarily his must be the principal responsibility for the general results. There is nothing in any of Earl Jellicoe's subsequent writings which even indicates a desire on his part to avoid such responsibility.

The tragedy of Jutland, from the British viewpoint, lay in its indecisiveness. There was the German fleet caught many miles from its shore fortifications by the greatly preponderant Grand Fleet—a long-hoped-for crucial opportunity never to recur. From the purely tactical viewpoint there seems no reason why the bold high seas fleet of the Germans should not have been easily and quickly annihilated if the action had been forced determinedly by the British fleet during those last two hours of daylight.

To the British advantage of nearly double the inherent power of their enemies should be added that of "surprise" and an ideal tactical position attained several times during the battle. Decisive results could be attained only by going to close quarters in the foggy weather, and this the British admiral was unwilling to do.

The reasons for Admiral Jellicoe's caution appear to have been strategical rather than tactical, though both of these arts were involved in them. He had some reason for believing that the Germans would not risk their fleet without making full use of submarines, mines and torpedoes to balance their other great deficiencies of strength. He felt that these devices might result in great losses of British battleships before coming into gun range. It was his fixed purpose before the action to guard against those new weapons by refusing to fight on the scene where the enemy appeared to desire battle. This involved extended high-speed maneuvering before accepting battle, and such was the primary characteristic of Jellicoe's tactics on the scene of Jutland, where as a matter of fact the Germans used neither mines nor submarines.

All these features and intentions were carefully outlined to the Admiralty by Jellicoe in October, 1914, and received the formal approval of his superiors in November of that year, eighteen months before Jutland.

Of course, the underlying motive in this tactical policy was insurance against the defeat of the Grand Fleet, which disaster would undoubtedly have been a strategical death knell to the whole Allied cause.

There are many who maintain that this defense policy involved greater strategic risks than a bolder one would have done. The urgent necessity of opening access through the Baltic to permit munitioning Russia required the severe defeat of the German fleet and probably would have saved the collapse of Russia. The annihilation of the Kaiser's fleet undoubtedly would have rendered impossible the submarine campaign. These are the arguments

of those who censure the policy which without doubt caused the indecisive results at Jutland.

At all events, the policy was Jellicoe's and it was he who personally carried it into execution at Jutland. It was by far the principal element in the outcome of Jutland. It is difficult to see how Beatty, the subordinate who showed unusual boldness at Jutland, can in any way be responsible for the general result.

So much for the question of fault for "whatever failure occurred at Jutland." Admiral Bacon's second charge relates to Beatty's action in attacking five German battle cruisers, with six of his own, without awaiting battleship reinforcements near by. The writer would commend such prompt and vigorous action in almost any situation, since it was in accord with the fundamental tactical principle of concentration, which in its application afloat usually calls for pressing without loss of time any advantage gained over the enemy through having superior forces present at the point of contact.

To use Nelson's pet expression, in naval battles "time is everything." Awaiting reinforcements when already superior in strength usually means valuable opportunities lost. Moreover, under the circumstances when Beatty's cruisers first sighted the Germans there was every reason for Beatty to be prompt and vigorous. He was in command of an advance detachment whose principal task was to develop the strength of the Germans as quickly as possible and inform the distant Grand Fleet, so that the latter could get into action with the high seas fleet if it proved to be near its cruisers. Beatty probably could not get this essential information without fighting for it. The quicker it was gotten the more valuable it would be to his commander-in-chief.

The third charge is that the loss of two of Beatty's battle cruisers was due to bad shooting, for which he was responsible. It would appear more logical to assume that the primary causes of the loss were good German shooting and effective German shells, probably combined with certain deficiencies in design of the armor protection of the British ships. They blew up very unexpectedly before being badly damaged, which seems to point to some serious inherent defect, irrespective of questions of gunnery.

It is a fact that poor shooting on one side almost automatically benefits the gunnery accuracy on the other. If it is a fact that British gunnery was bad, this would have had an indirect influence upon the loss of the two cruisers, and Admiral Beatty would have been to some extent responsible, since a commander cannot avoid responsibility for the general efficiency of his command.

The last charge to be considered here relates to the inadequate information received by Admiral Jellicoe concerning the movements and disposition of the high seas fleet during the interval when it was in contact with Beatty's forces, but before Jellicoe had succeeded in joining up. Admiral Jellicoe complains of this in his book, published in 1919, and apparently with good reason. The whole object of Beatty's forces during the three hours of preliminary fighting was to lead the Germans to the Grand Fleet.

Obviously success in this must depend upon the movements of the Grand Fleet, which in turn had to be governed by the reported movements of the German main body. A study of these reports, made by various vessels of Beatty's command during this critical period leads to the conclusion that Jellicoe was not kept as fully and as well informed as the situation demanded. The fault seems to lie most with the light cruisers, many of which were seldom in action and had good opportunities for observation. Beatty's battle cruisers and the attending four fast battleships were heavily engaged during most of the time in question, and the radio set of his flagship was put out of commission early in the battle. But wherever the fault

lay in detail, it must have been a consequence of deficiencies of tactical organization, instruction or training, for which Beatty, the commander of the detachment, was necessarily responsible.

The result was a serious unnecessary embarrassment to Admiral Jellicoe in his fleet deployment to take the best advantage of a wonderfully good tactical position which low visibility prevented his appreciating. If he had pressed that advantage, the German fleet must have been annihilated in a short time.

However, he succeeded twice afterward in attaining substantially the same advantageous tactical position, under circumstances in which Admiral Beatty had no important part, and each time turned away from the Germans to avoid the risk of torpedoes, instead of following up the advantage by pressing his enemy closely.

While it might be fair to place some of the blame on Beatty for the failure of the Grand Fleet to exploit the first situation, he could hardly be at fault for the subsequent lost opportunities to make Jutland decisive.

New Italian Warships

The Engineer, 28 November, 1924.—For many years before the war Italian naval policy was directed to the maintenance of the balance of power in the Adriatic. For this reason the strength of the Austro-Hungarian fleet was the standard by which Italy measured her own requirements. But with the fall of the Dual Monarchy, and its elimination as a factor in the naval situation, Italian strategists are turning their gaze to the broader waters of the Mediterranean. At the Washington Conference three years ago Italy was allotted a ratio of capital ship tonnage equal to that of France; but in neither country is any disposition shown to embark on the construction of heavy ships. It is to the cruiser of high speed, the well-armed destroyer, and the submarine, acting in conjunction with powerful air forces, that both states look for the decisive blow to be struck in a future Mediterranean campaign. So far as can be gathered, they have not entirely lost faith in the battleship as a weapon of oceanic warfare; but for operations in narrow seas they hold—not unreasonably, perhaps—the lighter and speedier craft to be preferable. This doctrine is reflected in the building programs on which they are now engaged. The French program has already been dealt with in these columns. The Italian scheme is more limited in scope, but it is plain from official utterances in Rome that naval construction on a larger scale will be undertaken when the national finances permit. The number and type of vessels now authorized and the years in which they are to be laid down are as follows:

1923-24	2 cruisers, 4 destroyers, 4 submarines
1924-25	2 cruisers, 4 destroyers, 4 submarines
1925-26	4 destroyers, 4 submarines
1926-27	4 destroyers, 4 submarines
1927-28	1 cruiser, 4 destroyers, 4 submarines

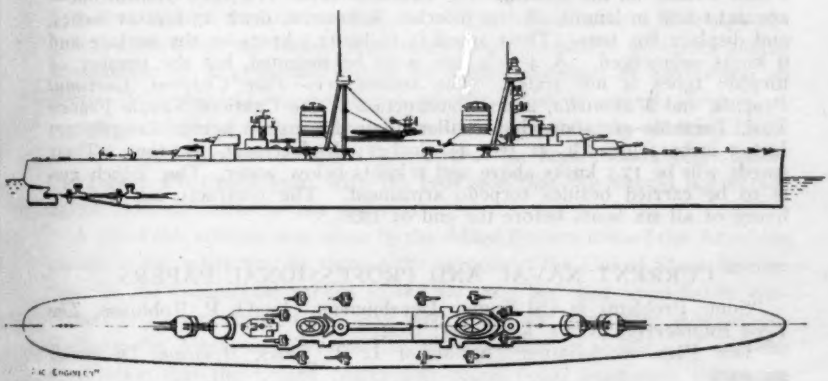
In addition, a number of minelayers and other auxiliaries are provided for.

All the vessels of the 1923-24 program are now on the stocks, and we are indebted to the Royal Ministry of Marine, in Rome, for particulars of their design. Of special interest are the two cruisers, *Trento* and *Trieste*, the first of which is being built by Orlando, at Leghorn, and the second by the Stabilimento Tecnico Triestino, at Trieste. They are the first cruisers designed within the limitations of the Washington Treaty as to displacement and armament, of which the dimensions and other features have been disclosed. Many ships of the same generic type are being built elsewhere—five in this country, two in France, and four in Japan—but little is known of them beyond the fact that they will displace 10,000 tons. We

believe, therefore, that the following description of the new Italian cruisers will be read with more than ordinary interest.

Length on water line	640ft. 9in.
Length between perpendiculars	615ft. 7in.
Breadth, maximum	67ft. 6in.
Draught, mean	18ft. 10½in.
Standard displacement	10,160 tons (metric)
Displacement on trials	10,980 tons (metric)
Speed	35 knots
Armament	Eight 8in. 50-cal. guns; twelve 4in., 46-cal. A.A. guns; eight torpedo tubes in pairs

Perhaps the most striking feature of the ships is their great length, having regard to their comparatively small tonnage. They are nearly 36 feet longer than our cruisers of the *Raleigh* class, which displace 9,750 tons, and are as long overall as our battleships of the *Queen Elizabeth* class. Particulars of their machinery are lacking, but to attain a speed of 35 knots the engines will have to develop at least 110,000 shaft horsepower, or 27,500 shaft horsepower per shaft. Their armor will doubtless be of the



NEW ITALIAN CRUISERS TRENTO AND TRIESTE

lightest, and it is uncertain whether bulges are to be fitted. The main armament of eight 8-inch guns is to be mounted in four barbettes, two at each end of the ship. Twelve 4-inch guns will form the secondary battery. These will have high-angle mountings, but will also be available for horizontal fire against surface targets. No other warship built up to now carries such a formidable armament of anti-aircraft guns, though the growing menace of air attack must soon compel designers to pay closer attention to this item of offensive equipment. The disposition of the twelve high-angle guns, as also of the main armament, is shown in the official diagrams we reproduce. Two airplanes will be carried. They will be launched by the "catapult," which is seen just forward of the main mast. The four pairs of torpedo tubes will be mounted above water, in accordance with a practice which of late years has become almost universal, the submerged tube having fallen into disfavor for ships of great speed. Good seagoing qualities should be assured by the lofty freeboard, and the high command of the guns ought to enable them to be fought effectively in almost any weather. The general design impresses us as an excellent one, though it will probably be found that the scantlings have been kept rather light and protection reduced to a minimum in order to gain the high speed aimed at.

The ships embody several of the requirements which Admiral of the Fleet Sir Doveton Sturdee, in a lecture on April 9 this year, laid down as desirable for future cruisers of the British Navy: viz., good seakeeping attributes—"probably the most important"—guns mounted as to height and manner as to be capable of effective use in most conditions of weather; a higher maximum speed than that of possible enemy battleships; powerful armament; ability to carry and launch two airplanes and anti-aircraft guns.

Eight of the new destroyers are already under construction—*Borea, Espero, Ostro,* and *Zeffiro,* by Ansaldo, at Sestri Ponente; *Aquilone* and *Turbine,* by Odèro, at Sestri Ponente; *Euro* and *Nembo,* by the Società Esercizio Bacini, Riba Trigoso. The leading particulars of these boats are as follows: Length, 305 feet 9 inches; breadth, 30 feet 2 inches; draught, 10 feet 8 inches; displacement, 1,355 tons metric; speed, 36 knots. Armament: Four 4.7-inch guns, six torpedo tubes. All are to be ready for trials by the close of 1926. The type, it will be observed, is very similar to that of our "Modified Admiralty W" class of destroyers.

The submarines in hand number six, two different designs being represented. The first three—*Giovanni Bausan, Marcantonio Colonna,* and *Vettor Pisani,* on the stocks at the Cantiere Naval Triestino, Monfalcone—are 223.1 feet in length, 18 feet 9 inches in breadth, draw 13 feet 11 inches, and displace 805 tons. Their speed is to be 17.5 knots on the surface and 9 knots submerged. A 4-inch gun is to be mounted, but the number of torpedo tubes is not stated. The second trio—*Pier Capponi, Giovanni Procida,* and *Masaniello,* under construction at the Cantiere Navale Franco Tosi, Taranto—are somewhat smaller, their dimensions being: Length, 213 feet 3 inches; breadth, 21 feet 4¾ inches; displacement, 780 tons. Their speeds will be 17.5 knots above and 9 knots below water. One 4-inch gun is to be carried besides torpedo armament. The contracts call for delivery of all six boats before the end of 1926.

CURRENT NAVAL AND PROFESSIONAL PAPERS

"Some Problems in Oil Engine Development," by O. P. Robinson, *The Tech Engineering News,* December, 1924.

"Our Place in Aviation," by Major L. T. Jones, *Aviation,* December 29, 1924.

"The Turbine Designer's Wind Tunnel," by H. Loring Wirt, Turbine Engineer, General Electric Co., *Mechanical Engineering,* January, 1925.

NOTES ON INTERNATIONAL AFFAIRS

PREPARED BY

PROFESSOR ALLAN WESTCOTT, U. S. NAVAL ACADEMY

UNITED STATES

AGREEMENT IN WAR CLAIMS PAYMENTS.—According to the agreement reached at the Allied Financial Conference in Paris during the second week of January, the total American war claims against Germany were set at $350,000,000, plus $250,000,000 for the cost of maintaining a Rhine Army. It was agreed that the Rhine Army costs should be paid in seventeen annual installments of $13,750,000 (instead of twelve payments of $20,000,000, as previously arranged) constituting a priority claim in receipts from Germany; and that the war damage claims should be settled by allotting to the United States two and one-fourth per cent of the reparations receipts under the Dawes Plan each year, with the provision that this should not exceed 45,000,000 gold marks in any one year.

A favorable attitude was taken by the Allied Powers toward the American claims in the belief that by signing the agreement the United States became "one of the contracting parties to the Dawes Plan" and immediately concerned in its enforcement. It was reported in the press that Ambassador Kellogg, the American representative, proposed that he should sign with the reservation that the United States was bound "only insofar as the rights of the United States were concerned," but the other delegates objected to this, and the signature was made without the reservation.

SENATE INQUIRY.—On January 19, Secretary Hughes issued a statement denying that the Paris agreement in any way committed the United States to closer participation in European affairs, and declaring that in case of German default the United States would still be entirely free to take any course advisable.

The Senate, however, on January 21, adopted a resolution requesting a copy of the agreement and other information "relevant to a full understanding of its terms." The object of the Senate inquiry was to determine: (1) whether the Paris agreement provided that the United States should not receive full payment of claims; (2) whether the agreement was, in effect, a treaty requiring Senate ratification; (3) whether the American representative sought to sign with reservations relieving the United States of participation in parts of the agreement not affecting the United States, and subsequently signed without this reservation.

SENATE REQUESTS ARMS CONFERENCE.—On January 21 the Senate adopted without discussion an amendment to the Naval Appropriations Bill requesting the President to invite "the Governments with which the United States has diplomatic relations" to a conference in Washington for reduction and limitation of land and sea armaments.

Since the President, prior to the amendment, had expressed a desire for such a conference, but also a belief that the international situation was not such as to make it possible, it was not anticipated that the Senate proposal would have immediate results. It was indicated from the White House that action must be postponed until it is seen whether the proposed League of Nations disarmament conference will be held or not.

KELLOGG SUCCEEDS HUGHES AS SECRETARY OF STATE.—On January 4 President Coolidge announced the resignation of Charles E. Hughes as Secretary of State, to take effect March 4, and the appointment of Frank B. Kellogg, Ambassador to England, as his successor. Mr. Hughes' only stated reason for resigning was a desire for relief from official burdens. It was announced from the White House that there would be no change in foreign policies from those pursued under Secretary Hughes.

FRANCE

FRENCH WAR DEBT PROPOSALS.—It became known in January that the French Minister of Finance, M. Clementel, in giving assurances that France had no intention of repudiating her obligations, had informally proposed through the American ambassador a debt settlement along the following lines: (1) a ten-year moratorium; (2) repayment to extend over eighty years, with progressive increases; (3) interest at one half of one per cent. It was expected, however, that France would attempt an agreement with Great Britain before making definite overtures to the United States.

Early in January notes relating to the French debt were exchanged between M. Clementel and the British Chancellor of the Exchequer, Winston Churchill. In these notes Mr. Churchill declared that the British policy was still guided by the Balfour Note of 1922 and the Curzon note of 1923. The first stated that England expected from her Continental debtors only enough to pay the United States, and the Curzon note declared that England would subtract from this all her receipts from Germany. Since the British debt to the United States is fourteen billion gold marks, and the British share of the Dawes annuities is about eight billion, this would leave six billion for the Continental debtors to pay, of which France would seek to shoulder only half. This would mean a seventy per cent reduction of the French debt to Great Britain, in reality a greater reduction than the French expect to secure.

GERMANY

CONSERVATIVE CABINET UNDER LUTHER.—After long delay and difficulty, during which the Clericals and Democrats balked at the plan of Foreign Minister Stresemann of the People's party to achieve a "bourgeois bloc" excluding Socialists and giving Nationalists preponderant strength, a ministry based on such a combination was finally achieved under Dr. Hans Luther, former Finance Minister under Marx. The cabinet, as first announced, was predominantly Nationalist, but with some representation from the Democratic, Clerical, and People's parties. Chancellor Luther in his inaugural statement declared the policy of his Government would be based on unequivocal recognition of the republican constitution, and loyal execution of the Dawes Plan. He received, on January 22, a vote of confidence of 246 to 160, though the parties composing the coalition should give a total of 303 votes against 190 in the opposition.

COLOGNE EVACUATION DELAYED.—According to the Versailles Treaty the Cologne bridge head was to be evacuated by the Allies on January 10, 1925, provided the terms of the treaty were loyally fulfilled by Germany. Early in January the German Government was notified that the evacuation would be indefinitely delayed, since the preliminary reports of the Allied Military Control Commission indicated violation of the military terms of the treaty. It was stated that, owing to failure to demilitarize the German police, the total military forces amounted to more than 200,000 or 100,000 in excess of the prescribed number. No date or conditions were set for the final evacuation. It was expected that the full report of the Control Commission would be submitted in January. Evacuation of Cologne by the British forces, which occupied the city, would have necessitated the substitution of French forces.

WAR THREAT OVER MAIL BOXES.—Serious difficulties developed in Danzig at the close of the year over an apparently trivial matter when the Polish Government attempted to put up Polish mail boxes in Danzig.

Briefly summed up, the dispute over the mail boxes amounts to this: Poland claimed the right to have her own mail boxes in Danzig. Danzig denied it. Danzig woke up one morning to find Polish mail boxes throughout the city and promptly protested, but Poland did not heed the protest. Then some Danzig hot-heads painted the Polish mail boxes in the old imperial German colors of black, white and red. This so angered the Poles that they threatened war. Then Danzig appealed to Commissioner MacDonnell, who in the name of the League of Nations asked the Poles to remove the boxes. The Poles refused, whereupon Mr. MacDonnell told the Danzig authorities to remove the boxes themselves, he assuming full responsibility.

Of course, there is a possibility that the whole affair may turn out to be a tempest in a mail box, but it has certainly roused Danzig and Warsaw to fever heat and is unquestionably causing plenty of worry at Geneva.—New York *Times*, January 16, 1925.

RUSSIA AND THE BALKANS

RUSSO-JAPANESE AGREEMENT.—A draft of the proposed agreement between Russia and Japan was published in the Tokio press of January 14. It was said that the two nations had nearly reached a settlement, the only outstanding difficulties being Japan's demand for fifty per cent instead of forty per cent of the oil concessions in Northern Sakhalin, for guarantees against propaganda, and for evacuation of Northern Sakhalin "as soon as practicable" and not immediately. The treaty was subsequently signed on January 21 at Peking.

The draft provides, among other things, for (1) Russia's agreement not to carry on propaganda in Japan "for purposes of disrupting political or social institutions"; (2) timber and mineral concessions to Japan; (3) reference of debts to subsequent negotiations, with declarations that neither nation has treaties or secret agreements with any third power menacing the other; (4) provision for oil concessions to Japan in Northern Sakhalin for five years, to be followed by concessions for forty years in all fields thus established, also for coal concessions over a specified area, with royalty to Russia of ten to fifteen per cent of the oil output; (5) Japan agrees that she will not ratify the protocol on Bessarabia, signed in 1921 at Paris by the ambassadors of four powers; (6) Russia expresses regret for the acts at Nikolaevsk in 1920.

EFFECT OF RUSSO-JAPANESE PACT.—By Alef de Ghizé, Baltimore *Sun*, 23 January, 1925.—New York, January 21.—Japan and Russia have joined hands in a treaty providing for resumption of diplomatic relations, signed in Peking last night.

To the general public this does not mean a great deal and the statesmen of the Occident apparently are indifferent to the situation, since it is due to their misinterpretation of facts that it has come about. In spite of this, however, it is of the most tremendous importance. It establishes, once and for all, the fusion of all the forces of the Orient in a league against the Occident.

The policy of Russia in the Far East and in Asia in general, although apparently based upon the possibility of Communist propaganda, has, as a matter of fact, a more realistic and practical aim. The Communist statesmen do not speculate upon empty theories; they know quite well that Communism, like all political and economic theories, is subject to an evolution which will change completely its character.

In other words, the situation in Russia will become normal and, if the state manages to retain certain prerogatives and rights unknown to European governments of the present time, this will be counterbalanced by the inevitable social law that life consists of work and that work is property.

Last year, in certain articles published in the Baltimore *Sun*, I stated that in Russia the future was in the hands of the rural population, and the present decision of the Soviets to seek the collaboration of delegates chosen by the peasants confirms my previsions. Also I said that Russia would certainly gain ground in the Orient, thanks to her attitude toward foreign powers.

It must be understood that in the Orient the only possible and practicable propaganda is nationalistic propaganda, and that is the plan of action which the Soviets are following. In all the Asiatic countries the situation would become very much the same as that in Russia today if the operation

of foreign capital should be made impossible, and in order to bring this about it is necessary only to inspire in these peoples the sentiment of *nationalisme á l'Européenne* which they have never felt.

This is facilitated by the fact that it is easy to put the blame for the discontent of the masses upon the exploitation of foreign capitalists.

In Persia, in Afghanistan, in Mongolia and recently in China the Bolsheviks have acquired a much more favorable position than that held by England or any other power by the sole expedient of renouncing all the claims and rights of the Russian Empire. This created a new situation and the Bolsheviks became the standard bearers of the rights of peoples and of nations.

Defeated in Europe by the emptiness of their theories and by the good sense of the working classes, they, in turn, defeat the foreign capitalists in the Orient by fostering nationalism.

The shifting of the political field of action of the Moscow Government will make Siberia the most important center of Russian activities. The projected railroads, joining the center of Siberia with the White Sea, prove the truth of this hypothesis, and Siberia is a home which no foreign power can disturb.

Japan is certainly not Bolshevik, but necessity is a law which is deaf to sentimental considerations. Japan perhaps understands better than anyone the evolution of Communism and to what end the laws of this evolution will lead. Japan also foresees the importance which Siberia will obtain in the new order of things, and especially she sees the future possibilities of Russia in China. Taking all this into consideration, her wisest policy is to treat and to assure herself of the advantages which the present situation offers to her.

It is evident that in associating herself with Russia in the exploitation of important concessions, Japan is entering, so to speak, into a collaboration of interests which time will develop into a sort of indispensable alliance. As these two nations are the only ones so situated as to command in China, with the exercise of a little tact, they will be able to supersede any and all of the other powers and will make that vast reservoir of men and resources converge into their orbit.

It might be objected that these countries do not possess financial means sufficient to satisfy the imperative demands for money, but this is absurd, for China, Persia, Afghanistan and India have existed for centuries without resources other than their own, and as the population has remained practically untouched by Occidental civilization, their needs have not increased and with the coming of order their life will again take up its old course, which was for so long quite independent of the Occident.

Will this league of the East against the West lead to the famous yellow peril? It does not seem likely. Western civilization is essentially cultural, and for the Orient to be able to absorb the Occident it would have to pass through the mill of Occidental culture. This would result in the wiping out of many of the differences which exist today, and the danger would be diminished rather than increased; but from the economic point of view this Oriental bloc will be fatal to the Occident, so fatal, indeed, that, disguised under all sorts of subterfuges, it has always been feared.

It is on acount of this menace that Baldwin's Government has taken an attitude of obstruction toward Moscow and is now trying to form a compact European bloc. Will Baldwin succeed? Will such a bloc be efficacious? It is doubtful. The class war, the problem of labor, the artificial life we now lead which demands an ever-increasing amount of means, all tend to make European governments subject to dangerous fluctuations, and it is clear that any change of government in one of the big nations would endanger the working of this precarious western alliance.

India causes more trouble to England with her policy of passive resistance than she could by open rebellion, and in the same way the Orient, by taking a morally hostile attitude, will exhaust the patience of the Occident and oblige it to compromise.

In the East time has no real value. In the West, however, everything being based on the principle of capital with pre-established obligations, time is a factor of the greatest importance, and the slightest trouble endangering commercial life will threaten the existence of a government.

There is no doubt of the fact that this Russo-Japanese understanding could have been avoided and that, by retaining Russia in the European orbit, the various nations interested in colonization would have had fewer troubles and difficulties to face than now.

Communism in Europe is a false alarm, but in the Orient it is disguised as nationalism and acquires, therefore, a certain right to be respected by us.

In order to attack this right it will not only be necessary to bring pressure upon the working classes but it is also indispensable to maintain a certain cooperation between the powers. This appears at the present time to be almost impossible, as each nation, owing to its financial penury, is obliged to follow a policy of purely personal interest, and therefore it seems very unlikely that the efforts of Baldwin's Government will be able to weaken the Soviet policy in the East.

TROTSKY DROPPED FROM SOVIET WAR COUNCIL.—By action taken at a plenary session of the Executive Committee of the Communist party on January 16, Leon Trotsky was dropped from the Soviet War Council and warned that continued disobedience to the party would result in his removal from the Political Bureau and the Soviet Executive Committee. Trotsky, who was president of the War Council, was absent at the time, owing to illness. In taking the action, the committee cited a long list of Trotsky's offenses extending over several years, particularly his anti-Leninist views regarding the peasants, and his general advocacy of compromise policies. The fall of Trotsky, frequently rumored before, was regarded as a triumph for the triumvirate of Zinovieff, Stalin and Kameneff, all three of whom, however, were rated as far below Trotsky in ability as Trotsky was below Lenin.

ALBANIA OUSTS FAN NOLLI.—On December 23, Bishop Fan Nolli, Harvard graduate and Premier of Albania, was driven out of the country and control was taken over by Ahmed Zogu, former premier and leader of the Albanian insurgents. Italy and Jugoslavia declared themselves in complete harmony in regard to Albania, and united in a policy of maintaining its independence and unhampered development under the new régime.

BALKANS UNITED AGAINST COMMUNISM, from New York *Times*, 24 December, 1924.—Belgrade, December 23.—The anti-Bolshevist front in the Balkans is beginning to take definite shape. The latest phase is marked by the triumphant return of the Yugoslav Foreign Minister, Ninchitch, from Paris, where he was invested, as it were, with the sword and banner of the new anti-Soviet crusade both by the French and British Governments.

In an interview in this morning's papers the Foreign Minister declares that Yugoslavia's position has been tremendously strengthened and her desires and demands find increasing appreciation with the great powers.

He added that Albanian complaints against Yugoslavia will be disregarded and that he has reached an agreement with Mussolini pledging both countries to respect Albanian independence.

M. Ninchitch further declared he had an opportunity to discuss the situation thoroughly with Mm. Painlevé and Loucheur and Austen Chamberlain regarding anti-Bolshevist action in the Balkans. Mr. Ninchitch said a similar movement was at present on foot in all Yugoslavia's domestic politics. The government, he added, would proceed with full severity of the law against those who work against the safety of the country with support of the third international.

This last part of the Minister's statement is interpreted as an indication of the government's intention to crush the opposition. A similar policy is being followed by the Bulgarian and Rumanian Governments.

It is reported that M. Ninchitch will meet the Roumanian Foreign Minister, M. Buca, early in January at Temesvar. This, of course, will be in connection with the anti-Bolshevist bloc.

The Bulgarian Premier, M. Tsankoff, will arrive in Belgrade on December 28, it is announced.

This means that, having got the sanction of Great Britain and France, the Balkan States will get down to brass tacks in dealing with the Bolshevist problem.

ITALY

MUSSOLINI WEATHERS CRISIS.—The Italian Chamber adjourned on January 17 after passing the electoral bill presented by the Mussolini Government. In the bill as finally passed, the provision providing for plural voting was withdrawn with the premier's consent. The bill was passed by a vote of 307 to 33, the so-called Aventine opposition continuing its policy of remaining absent. The three former premiers, Giolitti, Salandra, and Orlando, led the opposition in the chamber, declaring that no proper election could be held so long as the Fascisti continued their policy of wholesale arrests and throttling of the press.

The passage of the bill was significant chiefly as marking Mussolini's skill in coming through another difficult situation, since his downfall had been confidently predicted. Earlier in January the cabinet had been changed to a more decidedly Fascist character by the withdrawal of the two liberal members.

REVIEW OF BOOKS

THE STORY OF THE SEAMAN. By John Forsyth Meigs. 2 Vols. J. B. Lippincott Company. New York. 1924. $10.00.

REVIEWED BY REAR ADMIRAL C. F. GOODRICH, U. S. NAVY, RET.

The author of this monument of research and erudition was graduated from the Naval Academy in 1867. He served with exceptional credit in various capacities ashore and afloat, chiefly identifying himself with advances in ordnance and gunnery, branches of naval science in which he became an accepted authority. He was one of the most promising officers of his time, for whom his colleagues predicted a brilliant future with none to dispute him. Then two cruel blows fell upon him in rather quick succession. In 1891, a medical examination showed him to be color blind, a defect of vision of which it is believed that he was unaware. Naturally, he was placed upon the retired list. His knowledge of ordnance was so appreciated by the Bethlehem Iron Company, (later and at present, the Bethlehem Steel Company) that it promptly engaged him to assist in its armor plate and gun making work, a fresh undertaking at that time, due to the building up of our new Navy. In this respect he was of great help, both to that company and to the Navy itself. Unhappily for him, some Congressmen thought, or pretended to think, that an officer's standard of honor was so low that he could be guilty of using his acquaintance with those in authority at Washington and with the records and methods of the Department for the benefit of his employers, and to the detriment of the Navy. This preposterous and wholly unjustified contention found such favor at the Capital that little difficulty was encountered in passing an act prohibiting a naval officer, even on the retired list, from accepting employment by a firm or corporation manufacturing supplies of any kind for the government. Meigs had then to choose between abandoning this occupation, so dear to his heart, or resigning his commission. He adopted the latter course in 1896, that he might still prosecute what he considered to be his life's work. Thus our service lost directly, although it continued to profit indirectly, by his skill and ingenuity, an able and universally regretted member. He has, however, a high place among that galaxy of clever graduates which has done so much for the nation and for humanity in countless ways, astronomical, industrial, scientific and literary.

In 1910 he left Bethlehem and, as is said in the introduction to the volume under review, "took on the studies of the art of maritime transport and the protection of traffic which have resulted in this book." These studies were temporarily interrupted during the World War to resume his

activities as an ordance engineer. After the Armistice, he returned to his historical investigations.

The Story of the Seaman seems to be rather misleading as a title, implying, as it does, a tale or a series of yarns and episodes. Such, distinctly, it is not; rather, is it an exhaustive encyclopedia of nautical art from the earliest day to the middle of the last century. As a mine of maritime information it is unique and priceless; as a proof of the part of the seaman in advancing civilization, it is indispensable; as evidence that the command of the sea has always been essential in war, it admits of no challenge.

These volumes reveal an astounding assiduity in combing the very oldest records for the beginning of ships and sailors and for keeping up a research for data on the growth and use of vessels which covers all except the most recent history. The reader will perceive that his references are drawn from practically all times, all sources and all languages.

Herodotus, the Heimskringla, Pericles, Cicero, Offa's *Saxon Chronicle,* Sir Walter Raleigh, the Old Testament, Marco Polo, Nansen's *Northern Mists,* Arrian, Assurbanipal, Hesiod, Yule, Homer, Chaldea, Tyre, Sidon, the Vikings, Magellan, Babylon, Ancient Egypt, Pliny, Strabo, Assyria, Nineveh, Phoenicia, Rome, Carthage, Hannibal, Hamilcar, Darius, Pausanias, Ptolemy, Da Gama, Columbus and scores of other cities, countries, historians, sea fighters, cartographers and voyagers of discovery pass across his desk as he selects pertinent material for his accounts of ship building, ship rigging and ship propulsion; of the life of sailors, galley slaves and armed men afloat; of naval actions in ancient days and the Middle Ages. In short, it is impossible to name any form of maritime or naval activity during those periods which is not adequately treated in these pages.

Yet it must be conceded that this magnificent and abundant information is not as readily available as could be wished. It was apparently gathered and is presented, to a large extent, chronologically and not according to subjects. The table of contents gives only brief chapter headings. A new one, including the paragraph and section captions, would be valuable. The index might well be much fuller. Doubtless, the premature death of the author accounts for the absence of these desirable features. The fact that the punctuation is faulty tends to strengthen the presumption that the master's hand was lacking in the final labor of preparing the manuscript for publication. A bibliography would have spared much space in the footnotes, while an occasional map or chart for the period covered in the text would be most welcome.

It is the duty of the reviewer to point out the demerits of a book, in this case a very unwelcome one; yet, after all is said, these are but insignificant flaws in a marvelous picture.

The reviewer suggests that the readers (and he hopes there will be many of them) will benefit more and with greater interest by systematically following up one subject at a time rather than by going through the book page after page. A few of these topics may be mentioned merely as ex-

amples, since these volumes are rich in data on every phase of the seaman's life and progress. Of especial appeal to the naval officer is Sea Power. Its preponderant importance from the earliest times is here established beyond question. The ordnance expert can trace the growth of artillery from its inception (missile throwing by hand) through the catapult, the bow and cross bow, and the introduction of guns and muskets up to its present stage. The navigator and nautical astronomer might draw from these pages an account of the means and instruments used in bygone days for finding a ship's location at sea, as well as of ancient and later map making, lighthouses, etc. The naval tactician could well follow suit with a study of fleet maneuvers from their first examples; from the reports of Aegospotamos, Salamis, Ecnomus and other battles. Incidentally, he could touch upon the matter of signalling between ships. A wide and fruitful field is open to the naval constructor who cares to take up the history of his art. In this connection the reviewer is glad to be able to put him into communication with the results of the labors of the eminent Egyptologist, Dr. David Paton, which carry back this history to the oldest heiroglyphics. The naval surgeon could furnish a short treatise on ancient naval hygiene, such as it was; the humanitarian, another on what passed for discipline; the historian, one on the great voyages of discovery of the fifteenth and sixteenth centuries and the naval aspects of the Crusades; the economist, one on the growth of sea-borne commerce. None of these literati would need to go much outside Meigs' rich volumes.

The mention of the possibilities just enumerated indicates the catholic, all-embracing scope of Meigs' investigations and leaves one wondering how any man could have gone over so much ground and so thoroughly in the few years he was able to devote to it. To the average reader a long life would seem hardly adequate for such an achievement.

The Story of the Seaman will long remain the undisputed authority on the topics of which it treats. No library of reference, no student of nautical history can afford to be without it. As a basic encyclopedia, it deserves the widest circulation.

CUGLE'S PRACTICAL NAVIGATION. By Charles H. Cugle. E. P. Dutton and Co. New York, 1924. 351 pages. $6.00. Reviewed by Commander Benjamin Dutton, U. S. Navy.

The avowed intention of this book is to present the subject of navigation without presenting any of the theory. The method adopted under each sub-head is to first state the problem. This is followed by the necessary definitions with little or no discussion. Then follow elaborate rules to guide the student in each step of his solution. Finally numerous problems are stated and completely solved.

Following the scheme of the book as outlined above, the student may take up each subject in navigation, learn what the problem is, where to get

the necessary data for its solution, what to do with these data, and finally, to get the result, with only the smallest idea of the reasons behind it all.

The author has taken pains to make his rules provide for all possible situations and to make them aid the student in every step of his work. This, no doubt, is extremely necessary for the man who learns his navigation in such a manner. Probably many ambitious men in the merchant service who lack an academic education find it convenient to follow some such scheme in preparing themselves for officers' billets. They can thereby dodge the necessity of gaining any real knowledge of astronomy or of the theory of mathematics higher than arithmetic. It is problematical whether they save any labor in the end. Certainly the art is robbed of most of its interest when learned and practiced by this method.

Since men have learned to navigate by this method it must be conceded to be practicable. Should the reader chance to come across a copy of the book it will repay an examination, for it will show what poor tools some of his fellow mariners use in finding their way about the seas.

NORTH STAR NAVIGATION. By L. M. Berkeley. White Book and Supply Co. New York, 1924. 86 pages. $3.75. Reviewed by Commander Benjamin Dutton, U. S. Navy.

The following statement appears in the preface of this splendid little book: "the North Star, is . . . . the most important body, next to the sun, in the seaman's calendar." Influenced by this belief the author has worked out something new in navigation. Not many practical navigators will agree with the statement, but this will not detract from the admiration they will experience for the scholarly manner in which the author has developed and presented his subject. The method depends upon a function which, it is believed, has never been used in navigation heretofore; that is, the position angle from the North Star. This position angle, as the author uses it, is "what an hour angle would be if hour angles were measured with reference to Polaris instead of the pole." Two of these position angles are necessary for the solution; first, that of one of the principal navigational stars visible in north latitudes, and second, that of the north pole. Simultaneous altitudes of Polaris and another star having been taken these position angles are readily obtained by the formulas and tables which the author has prepared. This involves no more labor than the solution of a time sight. Once the position angles are obtained, the solutions for latitude and longitude and the azimuth of the North Star are very expeditiously and accurately made. For this solution no knowledge of the approximate position is required, other than enough to enable the navigator to determine the Greenwich date and time. The results are entirely free from errors due to an error in the latitude and longitude by account. The entire solution requires little more labor than the solution by logarithms for two lines of position and no plotting is required to determine the fix. If the North Star

were a bright star, and not, as it is, a faint star which is difficult to observe except under the most favorable conditions, the method would recommend itself, for it is simple and accurate. The method is available only in restricted latitudes, and within those latitudes only when the conditions are favorable for an observation of Polaris. Therefore it is not believed that it will be accepted very widely, because it introduces a new theory and a new set of tables, for only occasional use, in a field where the present method of determining lines of position is much more widely applicable, and gives results sufficiently accurate for the practical navigator.

To those officers who anticipate studying the book it is recommended that they first read the preface, then the conclusion, and, as soon as they enter the text, plot the figures on the plane of the horizon. The first two steps will put the reader in touch with the author's incentive, and the third will present the figures in the manner in which we are accustomed to work with them and make the discussion easier to follow.

Cory Issues Splendid Bulletin Describing Ships' Telegraphs and Associated Equipment

Immediately after the introduction of ships' telegraphs by Cory, in the year 1862, telegraphs became the universal standard for engine room, docking, steering, anchor and fire room orders, and rudder angle indicating.

The new Cory Bulletin, "Ships' Electrical and Mechanical Telegraphs, Gongs, Voice Tubes and Accessories, No. 85-29-A," contains a wealth of description and illustrations, and may be obtained by sending a request card to Chas. Cory & Son, Inc., 183-7 Varick St., New York. Just mention this publication when writing.

SECRETARY'S NOTES

Prize Essay Contest, 1925

The Board of Control announces that of the essays submitted in the Prize Essay Contest, 1925, the one entitled "The Trend of Naval Affairs" was awarded the Prize, carrying with it $200 cash, a gold medal, and a life membership in the Institute. The author is Lieutenant (j.g.) Roland E. Krause, U. S. Navy.

The essay entitled "History Repeats" was awarded the First Honorable Mention. Lieutenant Commander Oscar C. Badger, U. S. Navy, the author, was awarded a cash prize of $150.

The essay entitled "National Strategy" was awarded the Second Honorable Mention. The author, Lieutenant Commander H. H. Frost, U. S. Navy, was awarded a cash prize of $50.

Prize Essay Contest, 1926

The conditions for the Prize Essay Contest, 1926, will be announced in the April number of the PROCEEDINGS in a prominent place.

Membership

Present Membership, 4212. Changes since last report: New Members, 8. Resignations, 6. Deaths, 1. Total Increase, 1.

New members joining since last report:

Gavin, R. O.
Pyne, C. C., Midn., U.S.N.
Lincoln, P. S.
Blake, Robert, Captain, U.S.M.C.
Wilson, S. L., Lieut., U.S.N.
Moale, E. S., Ensign, U.S.C.G.
Badger, O. C., Lieut. Comdr., U.S.N.
Shearer, W. B.

New Books

Attention is invited to the following new books listed among the "Publications U. S. Naval Institute":

Notes on Naval Communication, 1924. Second edition.
Naval Aviation, 1925.
Naval Leadership, 1925. Second Edition.
Internal Combustion Engines, 1925.
A Spanish Nautical Phrase Book and Reader, 1925.

Articles

The Institute desires articles of interest to all branches of the service, including the reserve force. Non-members as well as members may submit articles, and authors receive due compensation for articles published. Compact, well digested articles are more likely to be accepted for early publication. In accepting articles for publication, the Institute reserves the right to have such articles revised or rearranged,

where necessary, in order to bring them up to the required standard of articles published in the PROCEEDINGS—the cost, if any, to be deducted from the compensation due the author.

Reprints of Articles Twenty copies of reprints are furnished authors free of charge. Additional copies to the number desired will be furnished at author's expense, provided request is made before going to press.

Discussions Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid for at approximately one-half the rate for original articles.

Book Reviews As soon as practicable after the publication of books on subjects of professional interest, the Institute aims to publish authoritative reviews of them.

Address of Members In the past, many errors have resulted from the habit of changing an officer's address as soon as his transfer orders are published in the papers. No change will be made in the future except upon receipt of notification by the member concerned, Reliance upon the former method may, in extreme cases, mean a delay of almost four months. To insure the prompt delivery of the PROCEEDINGS and other communications from the U. S. Naval Institute, it is essential that members and subscribers *notify the Secretary-Treasurer without delay of every change of address.* No responsibility can be accepted for failure to receive the PROCEEDINGS, where members fail to comply with this rule. Changes of address should reach the Institute by the 25th of the month, to be effective for the issue of the PROCEEDINGS of the following month.

Coupons for Applications For the convenience of members making application for membership or for subscription, or informing the Institute of changes of address, a number of blank forms will be found elsewhere in this issue. It is hoped that members will take full advantage of these in order to reduce clerical work of all concerned.

H. A. BALDRIDGE,
Captain, U. S. Navy, Secretary-Treasurer.